WORLD'S POULTRY SCIENCE JOURNAL

APRIL - JUNE

1957

Official Organ of the
WORLD'S POULTRY SCIENCE ASSOCIATION
Volume 13 - Number 2

A New International Document—It's Worth Looking Into!

INTERNATIONAL COMPOSITION

TABLE OF FEEDSTUFFS

IN FIVE LANGUAGES

English, French, German, Spanish, Italian

by

J. PERUCHON de BROCHARD
Président of the B.N.A.

R. RICARD
ENAM in Agriculture

H. TRIACA
UAM in Chemistry

This Table is a unique achievement in animal nutrition as it gives the following fundamental and practical data to the poultry and livestock raiser, the feed manufacturer, the nutrition expert and the scientist:

- PROGRESS MADE IN ANIMAL NUTRITION during the last decade, summarized in simple and efficient rules.—
- THOUSANDS OF FIGURES (expressed in the metric system) give not only classical data (protein, dry matter, fat, fiber, ash, phosphorus, calcium, manganese) but also analysis of thirteen different vitamins (A, D3, E, K, B1, B2, B6, PP, B12, H, folic acid, pantothenic acid, choline) and of nine trace elements (iron, cobalt, copper, zinc, sodium, chlorine, sulfur, magnesium, potassium).
- A NEW FEED FORMULATION METHOD showing how it is possible to calculate a balanced ration with the analytical data available in the Table.—
- A TECHNICAL VOCABULARY IN FIVE LANGUAGES which makes it possible to read any foreign text on animal production.—

WRITE NOW

TECHNICAL LENDING LIBRARY ON ANIMAL NUTRITION

BUREAU OF INTERNATIONAL B.N.A SCIENTIFIC ASSOCIATION ANIMAL NUTRITION

PRESIDENT: J. PÉRUCHON DE BROCHARD

81 a, Sylvabelle St., MARSEILLE (6), France

WORLD'S POULTRY SCIENCE JOURNAL

Voume 13 April-June Number 2

Editor

GUSTAVE F. HEUSER

Publication Committee

H. S. GUTTERIDGE, *Chairman*, Canada

J. R. CAVERS, Canada
J. W. DaCOSTA, Brazil
F. M. FRONDA, Philippines
A. M. GERICKE, South Africa
H. HAVERMANN, Germany
N. ISLAM, Pakistan
M. A. JULL, U.S.A.
E. KARPOFF, U.S.A.
J. W. KINGHORNE, U.S.A.
F. LIEVENS, Belgium
IAN MacDOUGALL, England
N. OLSSON, Sweden
K. SASAKI, Japan
F. A. SKALLER, Australia
W. D. TERMOHLEN, U.S.A.
P. UBBELS, Holland

Advertising Committee

J. D. SYKES, *Chairman*, U.S.A.

F. W. BRAY, Canada
J. DeBROIN, Canada
H. EBBELL, Switzerland
A. D. GOLDHAFT, U.S.A.
IAN MacDOUGALL, England
C. G. MAY, England
R. T. PARKHURST, U.S.A.
L. PASSEBORN, France
W. D. TERMOHLEN, U.S.A.
G. de VRIES, Holland
JAN WIJVERKENS, Belgium

Published quarterly by the

WORLD'S POULTRY SCIENCE ASSOCIATION

Cornell University, Ithaca, N. Y., U.S.A.

Membership dues $3.00 a year of which $2.50 is for a year's subscription to the "World's Poultry Science Journal." Subscription rate, $3.50 a year. Advertising rates upon application.

Entered as second class matter May 31, 1945 at the Post Office at Ithaca, N. Y., under the act of March 3, 1879.

OFFICERS OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

President, Dr. R. Coles (England)

Honorary Past Presidents

Professor A. Ghigi (Italy)
Mr. W. A. Kock (Denmark)
Mr. W. D. Termohlen (U.S.A.)
Mr. Alex Wiltzer (France)

Vice Presidents

Dr. H. Engler (Switzerland)
Dr. R. F. Gordon (England)
Mr. J. W. Kinghorne (U.S.A.)
Mr. C. S. Th. Van Gink (Netherlands)

Treasurer and Assistant-Secretary

Dr. G. F. Heuser (United States of America)

Secretary and Assistant-Treasurer

Major Ian Macdougall (England)

Members of Council:

Australia: Mr. V. H. Brann, Mr. M. Hull, Mr. N. Milne, Mr. F. A. Skaller and Mr. S. Trainor

Belgium: Mr. J. Van Ingelgem and Professor A. E. R. Willems

Canada: Professor J. R. Cavers, Mr. H. S. Gutteridge, and Mr. G. L. Landon.

Denmark: Mr. J. Traberg

Eire: Mr. D. Philpott

England: Mr. J. D. Blaxland, Dr. E. T. Halnan, Dr. C. Horton-Smith, Dr. S. K. Kon, Mr. F. Cumber, Dr. H. Temperton, and Mr. K. Wilson.

Finland: Professor N. Westermarck

France: Prof. G. Lesbouyries

Germany: Dr. A. von Burgsdorff-Garath and Dr. H. Havermann

Israel: Mr. A. Livshutz

Italy: Mr. F. Garagnani

Japan: Mr. Jirohiko Kondo and Prof. Kiyotsuna Sasaki

Netherlands: Professor L. de Blieck, Mr. J. D. Tukker, and Mr. P. Ubbels

New Zealand: Mr. F. C. Bobby

Northern Ireland: Mr. J. G. Rhynehart

Norway: Mr. L. Svendsen

Scotland: Dr. J. Duckworth and Mr. J. E. Wilson

South Africa: Professor A. M. Gericke, Mr. J. Hibbert, and Mr. M. S. Letty

Spain: Mr. Luis Latorre

Sweden: Mr. E. Haeggblom and Professor N. Olsson

Switzerland: Mr. H. Ebbell and Dr. E. Hess

Thailand: Prof. Luang Suwan

U.S.A.: Mr. H. H. Alp, Dr. C. D. Carpenter, Dr. E. M. Funk, Mr. R. M. Hanson, Dr. R. J. G. Jaap, Dr. M. A. Jull, Mr. M. C. Small, Mr. J. D. Sykes and Mr. D. M. Turnbull

CONTENTS

Chanticleer in Ancient Egypt
M. A. Jull 120

Results of Feeding Low Grade Cod Liver Oil on a Commercial Farm
A. C. Roux 122

Studies on the Preservation of Duck Eggs
S. Bose and T. D. Mahadevan 125

Today's Chickens Vaccinate Themselves
W. Winterfield and H. Seadale 132

High Efficiency Nutrition for Laying Hens
F. W. Hill 134

Thirty Thousand Chicks Arrive in India from the U.S.A. 136

World's Poultry Science Library 139

Review of Poultry Publications 142

Notices to Members 187

CHANTICLEER IN ANCIENT EGYPT

MORLEY A. JULL, U.S.O.M.
American Embassy, Cairo, Egypt

Fig. 1. Painting in the Greek style found in a house at Tuna-el-Gebel. (Keimer)

It is a well established fact that geese appear far more frequently than chickens in the ancient paintings and bas-reliefs in the momuments and ruins of Egypt. The reason for this is obvious, as explained by Professor L. Kleines in the October 1956 issue of Egypt Travel Magazine. The ancestors of present-day domestic breeds and varieties of chickens were widely distributed in India, the Malay Peninsula, Java and Sumatra. On the other hand, geese were prevalent in Egypt for some time before domesticated chickens appeared on the scene.

Apparently the first appearance of the likeness of a cockerel on an Egyptian monument dates from the time of the New Empire, 1580 to 1090 B.C. It is interesting to note that female chickens rarely, if ever, appear among the avian illustrations.

This is understandable when it is called to the attention of interested readers that bulls were worshiped, Mrs. Jull and I have visited the tombs of the bulls where the "sacred" bulls were placed in huge blue granite chambers measuring about 15 feet long by about 8 feet wide and by about 8 feet.

Fig. 2. Fighting cock from an ancient Palestinian seal; 600 B.C. (Keimer)

high. It was amazing to realize the respect the ancients paid to the bull but I respectfully suggest that their reverence for the bull did not exceed the ability of many Americans to "shoot the bull".

The fact that the chicken played an important part in early Egyptian civilization is borne out by mentioning that in the early history of Egypt, the tribute paid to Egypt by a conquered nation consisted of four chickens.

POULTRY INDUSTRY OF BRAZIL

The Brazilian poultry industry is concentrated around the main towns, as Rio de Janerio, Sao Paulo and Belo Horizonte within a radius of 200 km (125 miles).

In the geo-economics areas of these towns, hundreds of small hatcheries of 1,000 to 10,000 capacity and some big organizations with 100,000 chickens, are found.

In a general way, all Brazilian hatcheries use the system to keep the poultry in elevated poultry houses the year round, summer and winter, over wood rack floors.

The difference in temperatures of these seasons doesn't bring any trouble to this system, for the winter average temperature is 18°C (64°F) and 25°C (77°F) in summer.

The one-day old baby chicks trade is growing fast because of the airways, that allows quick deliveries to the farthest towns of the country.

Good results were not achieved with the Cooperative system. The biggest organizations came from private enterprise.

The industrial hybrids have had good acceptance. The use of antibiotics in the broiler production is spreading out.

The biggest troubles of Brazilian poultry development have been the shortage of wheat residues in the ration preparation; the lack of a scheme similar to the National Poultry Improvement Plan; and high prices of poultry equipment, specially incubators (one for 64,000 eggs cost about U.S. $25,000.)

The high prices of pure breeds makes them useless for meat, so it is necessary to cross them with native chickens. Nobody wants to eat a pure breed, they prefer to keep it.

The Associacao dos Avicultores de Minas Gerais has developed an ample extension plan including a Layer Contest. (Univ. of Md.)

RESULTS OF FEEDING LOW GRADE COD LIVER OIL ON A COMMERCIAL FARM

A. C. ROUX

Lemoenkloof Poultry Farm, Klipheuwel, Cape Province, South Africa

Severe financial loss has been experienced on our farm where cod liver oil of low vitamin D potency has been incorporated in poultry mashes. On the 25,000 hen battery plant large numbers of eggs were produced with poor quality shells and crooked breast bones occurred in cockerels.

Approximately 6,000 chickens varying in ages from four to eight weeks suffered from vitamin D deficiency and showed the following symptoms. First, a few chicks were noticed to have tender feet and roughened feathers. After a few strides they would crouch and would not move freely even when aroused. Two days later the whole batch of 6,000 chickens in a four-decked, wire-floored, carry-on battery (without access to sunlight in the brooder house) were affected. The bones were very soft and instead of snapping, the tendency was to bend. All breast bones were bent to either the right or the left. Articulation of the ribs with the vertebrae was notably enlarged. The upper mandible was long and could be bent double to the left or right.

To determine whether the particular cod liver oil under discussion was to blame, the following tests were made:

(1) The Silver Nitrate test was performed on a few tibiae. As a control, the tibia of a normal vigorous chick kept outdoors was used. No calcification occurred in the tibiae of some of the confined chicks, whereas the control tibia showed normal calcification.

(2) One batch of 75 chicks was given .5cc and 1.0cc of pure cod liver oil directly, into the crop. No improvement in the condition of the chicks was noted.

(3) Cod liver oil was fed ad-libitum, from a fountain; ± ½ gallon of this oil was greedily consumed by 75 chicks during two days. No improvement in the hardening of the bones could be noticed. The colour of the feathers of this whole batch of chicks changed from white to a dirty yellow within five days of feeding the cod liver oil. These chicks felt oily. A distinct smell of fish-oil was present in the vicinity of this particular batch of chicks.

The amount of cod liver oil was reduced from ½ gallon to ⅛ gallon per ton. This small amount of cod liver oil was

fed to supply the required amount of Vitamin A of which no deficiency could be observed. Synthetic Vitamin D3, in powder form, was incorporated into the mash at the level of one million International Units per ton of mash. Within a few days the "lazy" chicks became more energetic and within two weeks the carry-on battery was too confining for their vigorous romping.

Such functions as breeding, hatching and rearing, as well as, the mixing and formulating of mash, are performed on the farm. The feedstuffs are, however, obtained from all over the country. All chicks from day-old until they are slaughtered never touch the soil but are kept on wire and under asbestos roofs.

Whether birds under a corrugated asbestos sheet, and therefore out of the direct sunshine, will get sufficient ultraviolet rays to supply the required amount of Vitamin D, is doubtful and extremely improbable, as it has been proved that with the enclosure of hens to direct sunlight only, a slight increase in the Vitamin D content of the eggs is noticeable, whereas the addition of Vitamin D to the feed increases the Vitamin D content of their eggs more than threefold. No improvement of the rachitic condition could be observed after chicks suffering from rickets had been placed in outside coops with wire runs covered by corrugated asbestos sheets. (Fig 1.)

Fig. 1. The outside coops with open wire runs under corrugated asbestos sheets. Rachitic chicks showed no improvement in two weeks after being placed in these coops.

No rancidity was noticed in either the cod liver oil under discussion or in the balanced rations. Oxidation in the feed could neither have caused the destruction of Vitamin D as all mixtures were fed to the birds directly after mixing and at the maximum three days after the ration had been mixed. The lack of Vitamin D in the cod liver oil used, was most probably due to the destruction of this vitamin after prolonged storage in 45 gallon drums in direct sunlight.

The former Head of the University of Maryland poultry department, Dr. Morley A. Jull, makes a point at a meeting of over 200 Greek poultry producers gathered around the festive board at Meghara, a highly concentrated commerical egg-producing center about 18 miles west of Athens. There is a very active co-operative egg marketing organization located at Meghara.

Left to right: Mrs. E. Popapodolous, Mrs. Morley A. Jull, Morley A. Jull, and Mr. E. Popapodolus, Greek interpreter. The gentleman whose back of the head you see, is Mr. T. H. Yannopoulos, technical adviser, Greek National Poultry Producers Association

STUDIES ON THE PRESERVATION OF DUCK EGGS

By

S. BOSE and T. D. MAHADEVAN

Division of Poultry Research
I. V. R. I. Izatnagar, India

The ducks represent about 10 percent of the total population of poultry in the Indian Union. The ducks, in general, lay more eggs as compared to village hens. A Desi hen on an average lays 53 eggs per year but the average output of eggs per duck for India is 90 per-annum. The duck eggs are also much larger than those of the indigenous hens. In view of the higher output per bird and the larger size of eggs it is essential that the necessary steps should be taken for increased production of ducks in India. The ducks are also known to be fairly immune to the ravages of disease. Ducks generally prefer wet and marshy conditions and are thus kept mainly in Bengal, Madras, and Travancore States.

The annual production of eggs in the Indian Union at present is of the order of 1,341 millions and the duck eggs comprise about 15 p.c. of the total eggs produced. The system of poultry keeping and egg marketing prevailing in the country is in general, rather primitive. In the course of marketing, the loss due to stale eggs, breakages, embryo development, moulds, bacterial contamination etc., is enormous and at some periods of the year, it amounts to as much as 75 per cent. As in case of hen eggs, the spoilage of duck eggs in India mainly occurs owing to the fact that eggs become inedible due to embryo growth after about two days during the summer months. Bose and Mahadevan (1949) studied the comparative and complementary effects of heat treatment and limesealing on the keeping quality of hen eggs under adverse conditions of storage. The eggs without any treatment and also the eggs which were limesealed only, were found inedible owing to the development of embryos with blood formation when stored at room temperature (92°F) during the summer months. The heat treatment in water at 130°F for 15 minutes killed the embryos and stabilised the thick white and yolk quality of the eggs, without coagulating the content of the eggs.

A review of the literature reveals that no work has yet been carried out to study the quality factors of duck eggs and to devise effective methods for their preservation. The present investigation was, therefore, undertaken to

study the internal qualities of duck eggs objectively, during different storage periods and to determine the optimum conditions for processing duck eggs.

EXPERIMENTAL

Fresh duck eggs were obtained from a local back-yard farm. The eggs were candled and randomized in different groups to minimise differences in initial quality. The storage consisted of placing eggs in desiccators over saturated sodium chloride to give approximately 70 p. c. relative humidity. The desiccators were then kept in a room maintained at 60°F and the eggs were taken out for physical estimations after 8 and 12 weeks respectively. The physical measurements of quality in duck eggs included (1) Egg weight, (2) Shape, (3) Loss in weight during storage, (4) Air-cell size, (5) Egg shell thickness, (6) Yolk index, (7) Albumen index, (8) Outer thin white, (9) Egg-shell weight, (10) Yolk weight, and (11) Albumen weight. The methods of estimations were similar to those used by Bose and Mahadevan (1949).

Processing of duck eggs - The effects of heat treatment on duck eggs are recorded in Table I.

TABLE I

Effect of heat treatment on eggs.

Nature of treatment	Effect of heat treatment	
	Duck eggs	Hen eggs
Heated at 130°F for 15 minutes.	The thick white was coagulated-Embryo was killed.	No coagulation-Embryo was killed.
Heated at 130°F for 10 minutes.	Same as above	Same as above.
Heated at 127°F for 10 minutes.	The thick white slightly coagulated-Embryo was killed.	Same as above.
Heated at 126°F for 10 minutes.	No coagulation-Embryo was killed.	No coagulation-Embryo alive in most cases.
Heated at 118°F for ½ hour.	Thick white slightly coagulated-Embryo was alive in some cases.	No coagulation-Embryo alive.
Heated at 117°F for ½ hour.	No coagulation-Embryo alive.	No coagulation-Embryo alive.

The viability of embryo was tested by incubating the heat treated eggs for seven days. It will be observed from

Table I that the heat treatment of duck eggs in water at 130°F for 15 minutes, caused coagulation of the thick white of duck eggs. The above condition is, however, optimum for heat treating hen eggs (Bose and Stewart, 1948). Various trials were, therefore, undertaken to determine the optimum conditions for processing duck eggs. The results revealed that the heat treatment of duck eggs in water at 126°F for 10 minutes was most promising. The duck eggs heat treated at 126°F for 10 minutes showed the desired destruction of the embryo without any coagulation of the thick white.

Physical measurments of internal quality factors:—The physical estimations of quality factors on fresh duck eggs, processed eggs and stored eggs are recorded in Table II. Bose and Mahadevan (1949) have observed that deterioration of quality of hen eggs is accompanied by the progressive liquefaction of the thick white and by the progressive flattening of the yolk. The above changes occur owing to the escape of moisture and naturally-occuring carbon dioxide from the eggs during storage. As the egg-shell of duck eggs are thinner than that of hen eggs it was anticipated that the rate of deterioration of quality of duck eggs would be faster than that of hen eggs. But contrary to the expectations, it will be observed from Table II that the rate of deterioration of quality of duck eggs is very much slower than that of hen eggs.

DISCUSSION

(1) *Egg weight* - The weight of egg is important in determining price since the heavier egg has more food value than the smaller egg. The average weight of *Desi* eggs varies from 35 gm to 42 gm. The duck eggs are however much larger. The average weight of duck egg in India varies from 62 gm to 72 gm. In the present investigation the duck eggs were obtained from a local backyard farm and the weight of duck eggs ranged from 62.19 gm to 67.79 gm.

(2) *Shape* - The shape of an egg is determined by the ratio of length to width. An average hen egg shows a ratio of 1.37. The duck eggs in the present investigation gave a ratio of 1.39 with a range from 1.37 to 1.45. In duck eggs, therefore, the length is proportionately bigger than the width as compared with those of hen eggs.

TABLE II

*Studies on Duck Eggs (Fresh Fertile Eggs).**

Storage Condition	Nature of treatment	Egg weight in g.	Length width	Loss in weight in p. c.	Egg shell thickness in mm	Yolk index	Albumen index	Outer thin white in p. c.	Egg shell weight in p. c.	Yolk weight in p. c.	Albumen weight in per cent	Air-cell size in cm.
Not stored	Nil	65.09	1.39		0.32	0.449	0.094	46.20	9.32	33.64	57.04	1.65
"	Heated in water at 126°F for 10 minutes.	63.44	1.39	0.25	0.31	0.442	0.096	42.18	9.30	35.23	55.47	1.87
Stored for 4 days at 60°F and 90°% relative humidity.	Nil	62.25	1.45	0.30	0.30	0.429	0.090	51.61	9.76	34.95	55.29	2.04
"	Heated in water at 126°F for 10 minutes.	66.12	1.38	0.34	0.30	0.444	0.095	44.78	9.62	35.19	55.19	2.06
Stored for 8 weeks at 60°F and 70% relative humidity.	Nil	62.98	1.41	2.75	0.31	0.419	0.065	56.69	9.58	36.29	54.13	2.59
"	Heated in water at 126°F for 10 minutes.	62.19	1.37	2.99	0.32	0.427	0.092	54.91	9.63	35.68	54.69	2.74
Stored for 12 weeks at 60°F and 70% relative humidity.	Nil	66.12	1.39	3.01	0.31	0.382	0.058	61.82	9.26	40.74	50.00	2.79
"	Heated in water at 126°F for 10 minutes.	67.38	1.38	3.38	0.32	0.401	0.080	55.25	9.35	38.04	52.61	2.88
"	Limesealed	67.97	1.37	1.14	0.35	0.420	0.063	58.62	9.40	37.05	53.59	2.75
"	Heated in water at 126°F for 10 minutes & limesealed.	67.80	1.39	1.42	0.35	0.435	0.083	50.00	9.37	36.04	54.59	2.77

*The values are averages for 10-12-eggs.

(3) *Loss in weight during storage.* (4) *Air-cell size* and (5) *Egg shell thickness*:

The duck egg shell is thinner than the hen egg shell, but the shell membranes are tougher in texture. The thickness of the hen egg shell is of the order of 0.40 mm but it will be seen from Table II that the average thickness of the duck egg shell was 0.31 mm. The higher figure of 0.35 mm was observed in the case of limesealed eggs due to the deposition of lime on the egg shell. Although the duck egg shell was thinner than the hen egg shell, the loss in weight during storage was less in duck eggs than in hen eggs under similar conditions of storage. Working with hen eggs, Bose, Pal, Mahadevan and Narain (1955) observed that untreated and heat treated hen eggs stored for 8 and 12 weeks at 60°F and 70 per cent relative humidity showed losses in weight in per cent as 3.32, 3.99, 4.82 and 5.21 respectively. In the present investigation, the corresponding figures for duck eggs under similar conditions of storage were 2.75, 2.99, 3.01 and 3.38 respectively. The loss in weight during storage is brought about by the escape of moisture and gas from the egg through the shell pores. It is, therefore, evident that the number of effective pores in duck eggs are less than those present in hen eggs. The air cell sizes of the untreated and heat treated duck eggs stored for 8 and 12 weeks at 60°F and 70 per cent relative humidity were 2.59, 2.74, 2.79, and 2.88 cm respectively. It will be observed from Table II that the losses in weight and aircell sizes of limesealed eggs were smaller than the untreated eggs. The limesealing exerted its beneficial effect by preventing the escape of moisture and naturally-occurring carbon dioxide from the eggs.

(6) *Yolk index*, (7) *Albumen index* and (8) *Outer thin white*:—

The rate of deterioration of quality of duck eggs as determined by the condition of the yolk and the condition of the white was very much slower in duck eggs than hen eggs under similar conditions of storage. The yolk indices of the untreated and heat treated hen eggs stored at 60°F and 70 per cent relative humidity for 8 and 12 weeks were 0.324, 0.367, 0.322 and 0.331 respectively and the albumen indices were 0.040, 0.077, 0.039 and 0.069 respectively (Bose, Pal, Mahadevan and Narain, 1955). It will be seen from Table II that the corresponding figures for duck eggs under similar condition of storage were 0.419, 0.427, 0.382 and 0.401 respectively as yolk index and 0.065, 0.092, 0.058 and 0.080

respectively as albumen index. The slower rate of deterioration of quality of duck eggs is probably due to the larger content of mucin in the thick white of duck eggs and also due to the presence of the smaller number of effective pores in the duck's egg shell.

The percentage of outer thin white of duck eggs was more than that of hen eggs. It was also found to be more watery and the greenish yellow tinge which is so common in the outer thin white of hen eggs was lacking in duck eggs.

It is interesting to note from Table II that although the percentage loss in weight and aircell size in heat treated eggs were comparatively more than the untreated eggs, the yolk index and the albumen index of the heat treated eggs were higher than those of the untreated eggs. The eye appeal of the opened out heat treated eggs was better and palatability test also revealed that the heat treated eggs were superior than the untreated eggs. The yolk index and the albumen index are, therefore, very important criteria in determining the quality of eggs. The results on the combined effect of heat treating and limesealing were interesting in that they showed a complementary effect of limesealing on the yolk and albumen quality of the heat treated eggs.

(9) *Egg shell weight*, (10) *Yolk weight* and (11) *Albumen weight*:—From various observations on the different parts of the hen eggs. Jull (1924) found that on the average the albumen contributed 58.43 per cent, the yolk 30.99 and the shell 10.58 per cent. The estimations of different parts of the fresh duck eggs in the present investigation showed that the albumen contributed 57.04 percent, the yolk 33.64 percent and shell 9.32 per cent. The yolks of the duck eggs were bigger, showed a deeper yellow colour; the thick whites were firmer and more cloudy but the thin whites were more watery than the hen eggs. During storage the diffusion of water took place from the white into the yolk resulting in decrease in albumen weight with a proportionate increase in yolk weight. It will be seen from the Table II that rate of diffusion of water from the white into the yolk during storage was more rapid for untreated eggs than heat treated eggs and limesealed eggs.

The Cooking quality of duck eggs:—The duck eggs were found to substitute for hen eggs successfully when they were hard boiled, fried, poached, or scrambled. The yolks of duck eggs were as satisfactory as were the yolks of

hen eggs. The whites, however, showed considerable variation. The whites of duck eggs beat up slowly and did not give so large a volume or stand up so well as did the white from hen eggs, when beaten up in the Hobart Whipping Machine for 1½ minutes. The whipping quality of the whites of duck eggs was poor even when beaten up for 5 minutes. The poor whipping quality was due to the larger content of mucin in the thick white of the duck egg. When cakes were made of equal weights of hen and duck eggs the cakes in which duck eggs were used did not rise as much as those made from hen eggs. But the cakes made from equal weights of duck and hen yolks respectively gave uniformly good results both with regard to size and texture. (The Indian Poultry Gazette, January, 1956.)

REFERENCES

1. Bose, S. and T. D. Mahadevan (1949). The effect of heat treatment and limesealing on the preservation of shell eggs. Ind. Jour. Vet. Sci. and Ani. Husb. *19*:229. Indian Poultry Gazette Vol XXXIII (No. 3) :2.
2. Bose, S., A. K. Pal, T. D. Mahadevan and R. Narain. (1955). The determination of quality in eggs, based upon the physical and chemical characteristics of the eggs. Ind. Poultry Gazette. Vol XXXIX (No.2) :21.
3. Bose, S. and G. F. Stewart (1948). Comparative and complementary effects of heat treating and oiling shell eggs on their keeping quality. Poultry Science. *27*:228.
4. Jull, M. A. (1924). The relationship of the weight of the parts of the egg to the total egg weight. Poultry Science. *3*:77.

POULTRY PROGRESS IN EGYPT

In a letter received March 22 from Dr. Abbas Itriby, Director Animal Production Department, Ministry of Agriculture, Dokki, Cairo, Egypt, he advises me that "The poultry farms (operated by the Egyptian Ministry of Agriculture) are lively and trapnesting is going on strongly and when we see you here there will be lots of data, arabic figures, awaiting your analysis."

He advises me that a progeny-testing project that I developed for Mr. Ahmed Moustagir on developing a strain of birds for high egg production and good egg size, with yellow skin, and plummage pattern somewhat resembling the native Fayoumi is progressing favorably. *(Continued on page 133)*

TODAY'S CHICKENS VACCINATE THEMSELVES

W. WINTERFIELD and H. SEADALE
Department of Veterinary Science,
University of Massachusetts, U. S. A.

The "Do It Yourself" trend so popular today has apparently taken hold in the chicken yard. Chickens are doing a successful job of vaccinating themselves against Newcastle disease, a respiratory and nervous infection of poultry.

OLD METHOD TEDIOUS

Before the poultry industry increased in size and became more and more mechanized, the old method of vaccinating birds individually by administering vaccine through the eye was adequate, but today this process is tedious and time-consuming.

Searching for a more efficient procedure, research men explored the possibility of mass application of vaccines. Experiments under controlled conditions have proved that mass vaccination of birds through drinking water, dust, or spray with mild strains of Newcastle disease virus is as satisfactory a method as the vaccination of individual birds.

Thus far, commercial poultrymen have been enthusiastic about this mass method.

DOSAGE IMPORTANT

A vaccine may contain enough virus particles to immunize chickens when it is administered through the eye. However, when the same vaccine is diluted in drinking water, immunity may not be satisfactory, unless the vaccine is very potent.

What about the danger of overdosage? It is often more likely that the dosage may be insufficient or not potent enough.

Uniform, adequate dosage levels are easily provided in water vaccination procedures, regardless of whether chickens are housed or are on the range.

TIMING PROTECTS VACCINE

The preferred way to administer Newcastle vaccine in drinking water is to remove all drinking water from the birds a few hours before vaccination. In this way the birds will build up a thirst, take in more water, and thus consume a greater dosage of vaccine.

Furthermore, by allowing the water containing the vaccine to remain only a limited time (from one to three hours) in the chicken yard, there will be less danger of adverse effects by high temperatures, by chlorination, or by litter, feed, or fecal contamination.

STABILIZER ALSO PROTECTS

The addition of a protein-type stabilizer to the water also protects the vaccine against these effects and other unfavorable conditions.

Wherever various managemental errors and hidden infections such as CRD exist, water vaccination reduces severe reactions because it lessens physiological stress.

REVACCINATION BEFORE MATURITY

If flocks are vaccinated at an early age, they should be revaccinated just before sexual maturity. Here again, the water vaccination provides the necessary "booster." This method is particularly advantageous if the birds are still in range shelters, and if it is desirable to administer a uniform dosage.

ECONOMICAL AND EFFECTIVE

Although no one vaccination program can be selected as ideally suited for every farm, area, or individual situation, drinking-water vaccination stands out as an economical and effective means of mass immunization. Progressive poultrymen with large, efficient farms can very well integrate this new method in their management operations.

(Continued from page 131)

At the Dokki Ministry farm, Mr. Ibrahim Fooad is carrying on the project involving crossing Barred Plymouth Rocks with the native Fayoumi, which has dark colored skin and shanks and lays a relatively small egg.

Other projects started during my tenure of service in Egypt are progressing.

Dr. Itriby reminds me of the project under way to increase the egg production and body size of the native Dandarawy breed, which has demonstrated that it is relatively resistant to disease.

The FAO meeting for the Middle East will be held at Cairo in November.

(Morley A. Jull, U. S. O. M./G-FA, New York, N. Y.)

HIGH-EFFICIENCY NUTRITION FOR LAYING HENS

F. W. HILL
Cornell University, Ithaca, New York, U.S.A.

Do you know how much feed is required to make a dozen eggs? The answer to this question is an important one, because feed makes up the largest single cost in egg farming.

On the average, in 1955, cost-account farms in New York State required 6.3 pounds of feed to produce a dozen eggs. This was an improvement over a few years ago when the requirement was about 7. Greater improvements are possible, and are already taking place as a result of new findings in poultry nutrition research. With new style rations, feed requirement has been reduced to as little as 4 pounds per dozen eggs over a full production year, in experiments under practical conditions. Rations typical of old-style feeding programs, formulated without the benefits of newer findings, were found to require 40 per cent more feed per dozen eggs under the same conditions.

What makes for high efficiency in egg production? The first requirement is for a high rate of egg production, which in turn requires a high rate of feed intake. Efficiency increases with high production because most of the feed consumed by hens is used for current living costs and the maintenance of the body machinery; only a small fraction of the daily feed intake is used as raw material for egg production. High feed intake is necessary to provide the means for high production because current living costs and maintenance take top priority in the utilization of feed. In addition to these well-known general effects which apply regardless of the feeding program, the efficiency of egg production is governed by the energy content of the poultry ration. The energy content of rations for hens can be measured in Calories in much the same way that Calories can be counted in human diets. When all other needs have been met by formulating the ration to be adequate in minerals, vitamins, and protein, the number of pounds of a ration needed to meet the requirements of a flock of layers depends on how many Calories are supplied in each pound. The more Calories per pound, the less total feed is needed to meet the energy requirement.

Here is what Cornell experiments comparing layer rations with different energy levels have shown:

EGG PRODUCTION

Over the laying year as a whole, changes in energy level have not shown very much effect on egg production rate. In general, high energy levels have tended to stimulate production during the cold weather months, while during the rest of the year there was little or no difference between rations. This may be due to the fact that the highest energy requirement of the hen occurs during cold weather, but also factors of a seasonal nature may also be concerned.

EFFICIENCY

Even without any marked difference in egg production rate, the rations used showed very large differences in efficiency, measured as the amount of feed required to produce a dozen eggs. A low energy ration, such as those used 20 years ago, showed a requirement of nearly 6 pounds of feed per dozen eggs. Just replacing low-energy grain products (such as bran, middlings, and oats) with high-energy ingredients (corn and wheat) reduced the requirements to 4½ pounds of feed per dozen. When 5 per cent of fat was added to a ration already high in energy value, feed requirement was reduced nearly to 4 pounds of feed per dozen eggs, and even further improvements are possible.

Of special interest to the nutritionist, and of special importance to the egg producer, is the finding that the efficiency of egg production is proportional to energy level in the ration. For every increase in energy level over the wide range investigated thus far a proportionate increase in efficiency of production has been found. No ceiling on the energy level that can be used in layer rations is evident yet; levels of added fat up to at least 5 per cent of the ration are well utilized by hens, and have been adequately proved by practical experience.

HEALTH OF LAYERS

It has generally been found in experiments in energy nutrition that there is a slight tendency to maintain body weight at a higher level with high-energy rations. This may be why such rations sustain better winter production. At least for high-production Leghorns, the kind of hens used in the Cornell experiments, no special problems are evident with properly balanced high-energy rations.

As energy level is increased, other adjustments in the ration are necessary to maintain nutritive balance—for instance, a protein deficiency may be created if the energy level is raised without also raising the percentage of protein in the ration. A comparison can be made between hens fed high

energy rations adequate and marginal in protein content. On the basis of egg production rate and efficiency the rations were very similar, but feathering condition was very poor with the marginal ration. The poor feathering sometimes seen on farms using rations high in corn may be due to this relationship.

Research in the important area of energy nutrition is continuing at Cornell and elsewhere. One important phase is the determination of relative energy values of feedstuffs and rations to obtain more accurate information on which to base feeding programs. Other work is directed toward finding the relationship of other requirements to energy content of rations. The ultimate objective is to integrate all of these factors into a nutritional program of maximum economic efficiency in egg production.

(Farm Research, N.Y. State Agr. Exp. Sta., Geneva and Cornell University Agr. Exp. Sta., Ithaca, New York. April, 1957).

THIRTY THOUSAND CHICKS ARRIVE IN INDIA FROM THE U. S. A.

The longest shipment of baby chicks ever known to be made, arrived in New Delhi, India, February 17, on a flight almost half way round the world from Teterboro, New Jersey, USA by chartered plane. The shipment of chicks will provide the foundation breeding stock for an extensive poultry improvement program as a part of India's Second Five Year Plan of Development and represents some of the help being given by the USA through its mutual assistance or Point Four Program.

The chick assembling and exporting arrangements were made by Mr. R. Walter Bishop of the Agricultural Company of Pan-America, Guilford, Conn. Alan F. Parmalee, a U.S. poultryman, accompanied the chicks as caretaker, although no feeding and watering was done. Mr. Bishop has had the most experience of anyone in the country in shipping baby chicks, especially by air, and has been handling large assignments for over 15 years, now shipping to 50 countries every year.

The Agricultural Company of Pan-America faced the enormous task of assembling hatches from widely separated breeders, bringing off a timed-hatch, sex-separating the chicks at once, and immediately placing them, 100 to a carton, in

cardboard "chick pullmans." Special trucks, with hot water heat and air conditioning, were used to bring the chicks to the assembly point at the airport.

So delicate was this cargo, the journey so far, through so many changes of temperature, pressure and climate, that a cargo plane was not adequate, and an airline had to be found that would be willing to remove the seats and other human accommodations from a pressurized passenger plane.

Loading of the plane went smoothly, the cartons placed on racks for the best circulation. The huge C-54 could have held much more, but the expensive space was utilized to take advantage of the best ventilation.

A Meteor Transport Company, Teterboro, N. J., DC4 plane few the chicks from the USA to India in just 58 hours of which 50 hours represented flying time and 8 hours were used for refueling stops. Six stops were made between the States and New Delhi. These were at Goose Bay, Iceland, London, Rome, Nicosia (Cyprus) and Baharein. The flight schedule was arranged by BOAC. By the time the chicks reached New Delhi, they had gone through several major pressure changes and had been transported from cold New England to tropical India. The outside temperature of the plane varied from 10° below zero at Boothbay, Labrador, one of the stopping points enroute and 75-80° at points in Saudi Arabia or India. I believe the temperature would have been still higher in Saudi Arabia if the plane had stopped there during the day time but it was a night stop and the temperature was naturally at the lowest of the entire day. In Labrador it was necessary to put a lot of extra heat into the plane while the plane was standing at the airport but this was done quite successfully and maintained the temperature in the plane at 70° Fahrenheit while the outside temperature was 10° below zero.

Five trucks, laborers, onlookers and a delegation of TCM and Government of India officials were waiting at the New Delhi (Palam) Airport when the chicks arrived. Among the TCM personnel were Dr. Frank W. Parker, Chief Agriculturist; Oliver A. Bauman, Head, Animal Science Branch; and Dr. E. R. Halbrook, Poultry Husbandry Advisor. Among the Government of India, Ministry of Food and Agriculture officials were Shri R. L. Mehta, IAS, Joint Secretary; Shri T. S. Krishnamurti, Deputy Secretary Shri R. Vengu, Under Secretary;

and Dr. P. M. N. Naidu, Deputy Animal Husbandry Commissioner of the Indian Council of Agricultural Research. The Delhi State Government was represented by Dr. J. C. Ramchandani, Secretary and Development Commissioner and Dr. Nahar Singh Grewal, Poultry Development Officer.

The 300 boxes of chicks and 42 cases of hatching eggs were rushed to the Delhi State Poultry Farm where the chicks were placed under 150 electrically heated brooders newly constructed for the purpose. Feed and water were supplied the chicks immediately since they had been hatched some 72 to 80 hours before arrival and made the trip without feed or water as is customary and essential with newly hatched chicks.

Only one percent of the chicks, or one out of 100, died enroute. The shipment was therefore a remarkable success from the standpoint of condition of chicks at the time of arrival. The shipment consisted of one-half S.C. White Leghorn chicks and one-half S.C. Rhode Island Reds from points in New England and New York State. Only 15 percent of the chicks, or 4,500, were males and 85 percent or 25,500 were females. The percent loss of the males was 1.36 as compared to 0.92 for the females, although this mortality difference between sexes was not consistent among the six strains of chicks received.

The total mortality of the chicks during the first week after arrival, which might be attributed partially to the long shipment and partially to management factors, was 6.66 percent, starting with 1.16 percent for the first 24 hours after arrival, increasing to 2.40 percent for the next 24 hours, and then decreasing progressively to 1.42, 0.80, 0.30, 0.29 and 0.27. The higher mortality the second day was probably due to the weakness of the chicks that hatched first, some of which might have hatched 18 to 24 hours ahead of the general run.

About 5,000 of the chicks, which are to remain at the Delhi farm, were placed on experimental diets designed to determine the nutritional value of locally produced fishmeal, groundnut cake, bajra (millet), sharkliver oil, and mineral supplements in chick diets, in the early growing period.

The rest of the chicks from this shipment will be distributed to state government poultry farms over India, be studied for performance by strains, and be used as foundation breeding stock. These shipments were scheduled to start at 2 weeks of age and be completed by 7 to 8 after their arrival.

WORLD'S POULTRY SCIENCE LIBRARY

Reviewer:

W. D. TERMOHLEN
American Embassy
APO 500, c/o Postmaster
San Francisco, California, U.S.A.

Universal Waterfowl Standard and Judging Guide. Grow, Oscar. The American Waterfowl Association, Inc., P.O. Box 1890, Milwaukee 1, Wisconsin. pp. 109. 1956. price—$3.00.

The author is an outstanding authority on and judge of waterfowl. In the introduction, the President of the Waterfowl Association says this standard is the result of a "persistently articulate demand by waterfowl breeders for a cosmopolitan waterfowl standard, embracing authentic ideas of what constitutes the typical specimen in each breed, that could be universally accepted without revolutionizing the objectives and practices in widely dispersed waterfowl breeding areas."

In the Preface, the author has made a statement worthy of quoting. "No attempt has been made to list every known bird, or variety, of domestic ducks and geese for the reason many of them enjoy only a restricted local following and, therefore can claim no general interest. Such breeds and varieties are, for the most part, merely 'splinters' or deviates, from more widely recognized ones and fail to offer substantial advantages over them."

There is a quite complete Glossary of Terms, Nomenclature Diagram of Geese and Ducks and General Disqualifications. As an evidence of his experience and ability, Oscar Grow has written a short chapter of sound advice under the heading, For the Eyes of the Judge. Part I refers to geese and covers the descriptions of twelve breeds. Part II covers the descriptions of sixteen breeds of ducks. Part III very briefly touches on swans with the description of two breeds.

For most of the breeds there is a quite good profile sketch of the male bird, apparently drawn by the author, because the initials O.G. appear. There are quite a number of photographic illustrations, which unfortunately in most instances are not at all clear.

Practical Poultry Management, 6th Edition. Rice, James E. and Botsford, Harold E. John Wiley and Sons, New York, 1956. 449 pp.

The first edition of *Practical Poultry Management* was published in 1925. Professor Rice, the senior author, had been a pioneer in college teaching and Experiment Station research. He was the first head of the Poultry Department at Cornell University, and students of his training were carrying on work in other states, as well as such students of Professor Botsford in New York. The results of research being put into actual practice began to be really appreciated in the early 1920's. It can be said by students of the history of the poultry industry that 1925 can quite logically be regarded as the beginning of the modern poultry era. Professor Rice was a big figure in developing and making possible the modern poultry industry. The 1925 edition of *Practical Poultry Management* had its foundation at this historical time.

The first edition was prepared as a guide to vocational school pupils and poultrymen, whether they were keeping poultry on a commercial scale or in small flocks. Harold E. Botsford has carried out this purpose in the present edition. He has also made every attempt to bring the book up-to-date in respect to recent changes in practical and scientific knowledge.

There has been a reorganization of the chapters in the 6th edition. Prof. Botsford has not been guided by the old question —"Which came first, the hen or the egg?" He has started with "Brooding and Feeding Chickens" and covers the first eight weeks. "Selecting and Mating the Breeders" is chapter 18. "Hatching the Eggs" is chapter 20. "Shall I Be a Poultryman" is chapter 22. "Principles of Housing Poultry" is chapter 5. Some will criticize this arrangement and say it is illogical. Prof. Botsford answers this by saying the chapters are presented in line with present-day handling of poultry and that nothing need interfere with the reading or studying of subjects in any order desired.

Certain comments from the preface to the sixth edition are of interest. "Mass methods of keeping poultry and of brooding and rearing emphasize that consideration of the early needs and training of the chick is as important to its future life as early home training is to our children today." Quite right, Professor, and lack of attention to this principle can account for both human and poultry failures.

"Whatever the reason, new diseases gain in numbers and economic importance. Chronic respiratory disease and hemor-

rhaghic disease, for example, travel faster than research." Professor Rice, I am sure, if still alive today, would have something to say in this respect in regard to mass production methods and especially in regard to breeding and replacement stock.

"No less startling is what research continues to show concerning built-up litter, now changing, in relation to length of time in use, to the term compost litter.—Many poultrymen find the practice hard to accept because it appears to violate principles of sanitation.—Its success or failure appears to depend on the man using it." Yes, Professor, than can apply to all aspects of the poultry industry—the man or the woman.

The chapters on selecting and mating breeders have been reduced. This seems a logical step in a general poultry management book, especially in this modern day when generally it is cheaper for the average poultry raiser to buy his chicks from the specialist.

The list of Cornell University poultry experts who read and discussed various parts of the book with Prof. Botsford, all of whom are authors in their own right, is in itself a recommendation for the book.

International Composition Table of Feedstuffs. J. Peruchon de Brochard in collaboration with R. Ricard and H. Triaca. Bureau of Animal Nutrition, 81a, Sylvabelle St., Marseille (6), France.

This is a new international document in five lauguages (English, French, German, Spanish and Italian) that is worth looking into. It is unique in achievement as it gives the following data to the poultry and livestock raiser, the feed manufacurer, the nutrition expert and the scientist:

Progress made in animal nutrition during the last decade, summarized in simple and efficient rules.

Thousands of figures (expressed in the metric system) give not only classical data—protein, dry matter, fat, fiber, ash, phosphorus, calcium, manganese—but also analysis of thirteen different vitamins— A, D_3, E, B_1, B_2, B_6, PP, B_{12}, folic acid, pantothenic acid, choline—and of nine trace elements—iron, cobalt, copper, zinc, sodium, chlorine, sulphur, magnesium, potassium.

A new formulation method showing how it is possible to calculate a balanced ration.

A technical vocabulary in five languages which makes it possible to read foreign texts on animal production.

This publication can be loaned from the technical lending library of the Bureau of Animal Nutrition. The reader can keep the publications by forwarding of subscription of $3.00.

REVIEW OF POULTRY PUBLICATIONS

Compiled by J. W. Kinghorne,

1365 Iris St., N.W.

Washington 12, D.C., U.S.A.

(Abstracts from *Animal Breeding Abstracts* and from *Nutrition Abstracts and Reviews* are reproduced by arrangement with the Commonwealth Agricultural Bureaux, Farnham Royal, Bucks, England.

Acknowledgement is also made to Biological Abstracts, University of Pennsylvania, Philadelphia 4, Pennsylvania, U.S.A., for the abstracts taken from *Biological Abstracts.*)

GENETICS

ASMUNDSON, V. S., and **C. F. PUN.** 1956. (Dep. Poult. Husb., Univ. California, Davis.)

CROOKED NECK DWARF IN THE TURKEY. *J. exp. Zool., 131:* 225-237.—At 26-28 days of incubation, crooked neck dwarf turkey embryos have a slightly shorter upper than lower beak, slender leg bones, curled toes, much reduced pectoral and leg muscles, and a rigid neck and tibiotarsometatarsal joint. The digestive tract is empty, except for a bile-like substance which is usually present. Most of the crooked dwarf embryos survive to the 28th day of incubation but are unable to pip the shell. Growth is retarded, no doubt due largely, although not entirely, to starvation. The weights of thyroid, testes, liver and proventriculus are less than in normal embryos. Available evidence suggests that the crooked neck dwarf syndrome is due to an autosomal recessive gene in homozygous condition. The abnormality was observed in Broad Breasted Bronze turkeys and in non-bronze birds partly descended from the Bronze breed. (Animal Breeding Abstracts)

BRATANOV, K., and **G. RADEV,** 1955. Opiti za otdalečena mezduvidova hibridizacija črez prelivane na krav pri pticite.

INTERSPECIFIC HYBRIDISATION BY BLOOD TRANSFER IN POULTRY. *Izv. Inst. Zivotn,* [*Sofija*], *6:* 145-153. [Russian and German summaries.] For 150 days before laying started, 10 cm.^{3} turkey blood was injected every 3rd day into Leghorn pullets. The erythrocyte number and Hb. content of the blood were increased. Egg production exceeded that of untreated controls by 19% and egg weight averaged 66.5 g. *v.* 54 g. for eggs of controls. The chicks hatched from eggs laid by treated hens grew more quickly and were hardier than control chicks; the majority of the experimental chicks had some black plumage resembling that of the turkey.—Abstract of Russian summary. (Animal Breeding Abstracts)

BRUNSON, C. C., GEORGE F. GODFREY, and **B. L. GOODMAN.** (Oklahoma Agric. Expt. Sta., Stillwater.)

HERITABILITY OF ALL-OR-NONE TRAITS: HATACHABILITY AND RESISTANCE TO DEATH TO TEN WEEKS OF AGE. *Poultry Sci. 35(3):* 516-523. 1956.—Hatchability and mortality data were studied in 4 hatches of New Hampshires, Silver Oklabars, and reciprocal crosses between these breeds. Heterotic effects, heritability

estimates, and maternal effects for hatchability and resistance to death to 10 weeks of age were analyzed. Results were as follows: No heterotic effect was evident on the percentage hatch of fertile eggs, the percentage hatch of total eggs or on resistance to death to 10 weeks of age. Mean heritability estimates based on the sires' contribution to the genetic variance were .11 for percentage hatch of all eggs set, .04 for percentage hatch of fertile eggs and .05 for resistance to death to 10 weeks of age. When these values were transformed to the probit scale, the means were .20, .08 and .16, respectively. Mean maternal effects were .17 for percentage hatch of all eggs, .13 for percentage hatch of fertile eggs and .06 for resistance to death to 10 weeks of age. When these values were transformed to the probit scale, the means were .34, .32 and .26, respectively.—*C. C. Brunson.* (Biological Abstracts)

CARSON, J. D. 1956. [Utah Agric. Exp. Sta., Logan.]
HYBRIDIZATION. NEXT BIG STEP IN TURKEY BREEDING. *Fm Home Sci.* [*Utah agric. Exp. Sta.*], *17:* 11, 24-25.—Results of reciprocal crossing between 8 strains of Broad Breasted Bronze turkeys over a period of 4 yrs. at Utah Agricultural Experiment Station are briefly reported. Live weight at maturity in ♂ and ♀ birds averaged 24.0 and 15.6 lb. resp. in crosses *v.* 20.6 and 14.3 lb. in purebred strains. Food conversion was 2-3% more efficient in the crosses. Although there was no consistent difference in fertility between crosses and purebreds, hatching percentage in 1955, based on number of fertile eggs, was 15% higher in the former than in the latter. (Animal Breeding Abstracts)

CLARK, T. B. 1954. [West Virginia Univ. Agric. Exp. Sta., Morgantown.]
HATCHABILITY IN BROAD-BREASTED BRONZE TURKEYS. *Sci. serves your Fm* [*W. Va. Univ. agric. Exp. Sta.*], Fall 1954: 6. In order to test the effect of brother-sister matings on hatchability, in each of 3 yrs. eight B.B.B. ♂ ♂ were mated to their full sisters, their half-sisters and to unrelated hens (sisters to each other). Fertility was not affected by the close matings, but even though the sister groups related to the toms had been selected on a family basis for high hatchability, each year hatchability was lowest therein; it was highest in the group not related to the toms. Failure of pipped eggs to hatch was the chief cause of lower hatchability. Environment factors could account for the large variation between hatches. (Animal Breeding Abstracts)

DOMINGUES, O.
DID THE MEDITERRANEAN TYPE OF FOWL COME FROM INDIA? *Rev. Agric.* [*Piracicaba*] *30(4/5/6):* 85-88. 1955.—The author accepts Barkakati's Miri breed as transitional between *Gallus bankiva* and Mediterranean breeds of the domestic fowl. He then theorizes that the "Mediterranian type" came from India to Europe at an earlier time than did the Asiatic breeds.—*F. J. Jeffrey.* (Biological Abstracts)

GERENSCER, V., and **N. NAGY**
CROSSBREEDING OF POULTRY. *(Haszonállatelöállitó keresztezés a baromfitenyésztésben.) Agrártudomány, Budapest, 1956,* 4. p 214.—It is known that the crossing of some fowl breeds, in comparison with purebred stocks show better laying results, a quicker development, a more favourable egg-production capacity, and a considerably greater capacity of resistance against infectious diseases. The level of the production capacity in the breeds used for crossing considerably influences the characteristics of crossed individuals. The differing results of various crossing combinations call attention to the fact that the most successful combinations have not been found yet. For the production of roasting chickens good results can be attained if females of Hungarian breeds are mated with Plymouth, New-Hampshire and Rhode-Island cocks. In the course of crossing not every characteristic appears in a favourable form surpassing the parental breeds. Thus the food utilization capacity of the crossed animal does not improve considerably. A disadvantage in breeding for meat is the disliked dark or black colour which appears in the female progeny of some crossings. The successful application of crossing in commercial poultry would motivate a more

intensive breeding program of the standard breeds in Hungary. (Hungarian Agricultural Review, Vol. 3, 1956.)

GERICKE, A. M.
BREEDING OF POULTRY FOR RESISTANCE TO DISEASE AND VIABILITY. *Farming in S. Africa 31(360):* 187-192, 206. (1956). —A general review is given of mortality in poultry, infectious diseases, nutritional deficiencies and the procedure in breeding for resistance and viability.—*A. M. Gericke.* (Biological Abstracts)

GROMOV, A. M., and **P. I. FEOKTISTOV,** 1956. [Poult. Breed. Res. Inst., Minist. Agric., R.S.F.S.R.] Izmenenie nasledstvennosti u kur posredstvom perelivanija krovi.
CHANGES IN THE INHERITED CHARACTERS OF HENS BY BLOOD TRANSFUSIONS. *Pticevodstvo, 6(5):* 42-45.—The blood of Australorp (black) fowls or Bronze turkeys was injected into White Leghorn ♂♂ and ♀♀, and that of guinea-fowls into Plymouth Rock (white) ♂♂ and ♀♀. The av. live weight of chicks hatched from the eggs of treated hens was greater than that of their dams or of the donors' chicks. Some of the chicks of injected hens had black markings on the plumage. Blood of the breed or species used to inject the dams was also injected into the F_1; 743 F_2 chicks were reared. These also showed signs of vegetative heterosis and a number had plumage abnormalities. The transfer of inherited characters was most pronounced when guinea-fowl blood was used. (Animal Breeding Abstracts)

JONES, D. G., and **W. MORGAN,** 1956. [South Dakota State Coll., Brookings.]
WOOLLY FEATHERING IN THE FOWL. *J. Hered., 47:* 137-141. —The woolly (*wo*) mutation was discovered in 1948 in a stock of White Plymouth Rocks at South Dakota Agricultural Experiment Station. It was briefly described by Jones and Kohlmeyer in 1950 [*see A. B. A., 19,* No. 948]. Severely affected chicks have a semi-naked appearance, while those that are less severely affected may appear normal, except for a shortening of the down. Newly-hatched mutants are characterised by the sleek, shiny appearance of the feet and legs, particularly the backs of the shanks and underparts of the feet. Test matings have indicated that the condition is due to a simple Mendelian autosomal recessive gene with complete penetrance.
In matings where the general level of hatchability was high, the mutation did not seriously affect the hatching ability of the eggs, but in stocks with a lower general level of hatchability, the presence of the woolly mutation seemed to cause an abnormally high mortality rate during the last 3 days of incubation. Woolly chicks were generally less active than normals at hatching and appeared to require more environmental heat, but the 2-wk. survival rate (87.5%) was reasonably good. Woolly ♂♂ became sexually mature at about the same age as normal ♂♂, but woolly pullets appeared to be later than normals in beginning to lay. When adult, the woollies were smaller than normal birds. Egg size also tended to be below the average for the strain. (Animal Breeding Abstracts)

JULL, MORLEY A. (U.S.O.M. Amer. Embassy, Cairo, Egypt.)
SOME POULTRY BREEDING PROBLEMS IN EGYPT. *World's Poultry Sci. Jour. 12(2):* 122-125 1956.—Egypt's population is increasing faster than food production. Native breeds of chicken, the Baladi, Dandarawi, and Fayoumi are small, with annual production of about 155 eggs and a clutch size of about 1.8. First generation imported strains showed poor disease resistance, but it improved in two years.—*J. B. Christiansen.* (Biological Abstracts)

KARAPETJAN, S. K., and **M. N. GUKASJAN,** 1956. [Acad. Sci., Armenian S.S.R.] Rabota po sozdaniju erevanskoi porodnoi gruppy kur.
FORMATION OF THE EREVAN BREED GROUP OF FOWL. *Pticevodstvo, 6(7):* 23-26.—At the Erevan Experimental Base of the Institute of Animal Breeding of Armenia the indigenous fowls had a

low live weight and low egg production. Rhode Island Red cocks were first used on the indigenous hens in 1949; the 2nd generation was formed by using the best 1st generation ♂♂ on indigenous ♀♀, and the 3rd generation by using ♂♂ of the 2nd on ♀♀ of the 1st generation. Mating *inter se* was begun in the 3rd generation. In 4-5 yrs. a uniform breed group with characteristics distinguishing it from the parent breeds was developed. Live weight averages 2-2.1 kg. for ♀♀ and 3-3.2 kg. for ♂♂, which is considerably greater than that of indigenous birds and only slightly less than that of the R.I.R.'s bred at the Experimental Base; 6 av. body measurements are tabulated for ♂♂ and ♀♀. The birds are red with speckles, self light red, or dark brown with speckles. The meat quality is good, and the carcass yields 88-90% meat. In 1951-54 production averaged 133 eggs per yr.; it averaged 153 eggs in a selected flock. Individual hens produced up to 241 eggs. The majority of the egg shells are light brown; 15-16% are white. Pullets come into lay at 5-6 mths. old and produce 60-80 eggs in the 1st yr. The Erevan fowls are thrifty, and mortality is low. Although fertility averages 90%, hatchability is only 60-75%. There are now 760 Erevan fowls at the Experimental Base and about 1270 at various farms. (Animal Breeding Abstracts)

LAURENT, F. 1956. [Inst. Oka, La Trappe, P.Q.] Développement d'un oiseau à blanc dominant en vue de la production de la chair.

DEVELOPMENT OF A DOMINANT WHITE BIRD FOR THE PRODUCTION OF MEAT. *Rev. Oka, 30:* 28-29.—Since 1954 an attempt has been made to develop a new type of broiler with dominant white feathering. Originally 2 White Leghorn ♂♂ were mated to 20 Barred Plymouth Rock ♀♀. Six ♂ and 75 ♀ progeny were mated *inter se*, but as none of the ♂♂ in the 2nd generation was considered suitable for breeding, White Wyandotte ♂♂ were introduced. Vigour was excellent and growth and feathering rapid in the 3rd generation, but White Plymouth Rock ♂♂ are to be used in the autumn of 1956 to improve fertility. (Animal Breeding Abstracts)

LANDAUER, W. 1956.

CYCLOPIA AND RELATED DEFECTS AS A LETHAL MUTATION OF FOWL. *J. Genet., 54:* 219-235.—The malformations here described ranged from relatively minor facial defects (*e.g.* absence of the premaxillae) to nearly complete absence of the head. In many of the embryos the eyes were transposed forward until they touched each other and even coalesced. In more extreme cases a single median eye was found on the roof of the oral cavity. All embryos with perocephalic malformations were the descendants of crosses between recessive rumpless fowls and 3 different and unrelated breeds, Silver Grey Dorking, Rhode Island Red, and jungle fowl. The condition seems to be due to a single recessive gene substitution. In the recessive rumpless stock it was generally completely suppressed phenotypicallly by modifying genes, but in the outcrosses the incidence rose, presumably on account of dilution of the protective modifiers. (Animal Breeding Abstracts)

LANDAUER, W. 1956.

A SECOND DIPLOPOD MUTATION OF THE FOWL. *J. Hered., 47:* 57-63.—In 1951 a lethal mutation with a phenotype very similar to that of White Leghorn diplopodia was observed in Black Minorca fowl. The 2 types of diplopodia are compared phenotypically and genetically. The results of test matings have indicated that each is inherited as a simple autosomal recessive trait, and that the 2 mutations are discrete and non-allelic. The symbol *dp*-1 is suggested for W.L. diplopodia and *dp*-2 for its B.M. mimic. (Animal Breeding Abstracts)

LANDAUER, W. 1956.

RUDIMENTATION AND DUPLICATION OF THE RADIUS IN THE DUPLICATE MUTANT FORM OF FOWL. *J. Genet., 54:* 199-218.—The duplicate (Po^4) mutation is responsible for preaxial polydactyly of a type generally more extreme than that caused by its allele, *Po*. In addition to its effects on the foot, it produces varying degrees of polydactyly of the avian hand, ranging from inconspicuous accessory 2nd fingers to nearly complete reduplications of the hand with typical

mirror imaging. Of 3444 birds either heterozygous or homozygous for the duplicate gene, 1744 had some kind of radius abnormality. Reduction in size or complete absence of the radius was observed in 940 individuals (in 538 bilaterally, in 163 on the left side and 239 on the right side). In 764 individuals there was partial or complete duplication of the radius (in 316 bilaterally, in 217 in the left wing, and in 231 in the right wing). In 40 cases there was radius hypoplasia or aplasia in one wing and radius duplication in the other.

The duplicate gene behaves as a dominant, probably with complete penetrance in respect of foot abnormalities, although continuous variation in the extent of duplication is produced by multiple genes. In homozygous condition its effects are semi-lethal. Various genetical investigations are described. The incidence of radius abnormality could be increased by selection; it was easier to achieve high penetrance of hyplasia and aplasia than of duplication. Malformations of the radius were more common in homozygous than in heterozygous duplicate fowls but they seemed not to be more extreme. (Animal Breeding Abstracts)

LANDAUER, W. 1956. [Storrs Agric. Exp. Sta., Univ. Connecticut, Storrs.]
HEREDITARY AND INDUCED CROSS-BEAK OF FOWL. EXPERIMENTS WITH ETHYL CARBAMATE. *J. exp. Zool., 132:* 25-38—Cross-beak was induced in Black Minorca, and to a lesser extent in White Leghorn embryos by the injection of 30 or 40 mg. ethyl carbamate into the yolk sac. Dosage effects and effects of time of injection on the incidence of short upper beak and cross-beak are described. At most stages ethyl carbamate produced a considerably higher incidence of beak abnormalities in Black Minorcas than in White Leghorns. The Black Minorca stock also showed a markedly greater tendency to sporadic cross-beak, a condition believed to be determined by multiple genes with incomplete penetrance. The abnormalities of the visceral skeleton of embryos with the induced defect were identical with those observed in hereditary cross-beak. (Animal Breeding Abstracts)

LANDAUER, W. 1956.
INTERACTION OF THE CREEPER AND DUPLICATE MUTATIONS OF FOWL. MODIFIER EFFECTS ON THE ABNORMALITIES OF THE RADIUS. *J. exp. Zool., 132:* 105-110.—The Creeper mutation of fowl acts as a potent modifier of certain phenotypic features of the "duplicate" gene. The frequency of incomplete formation or entire lack of the radius is reduced in the presence of the Creeper mutation and the incidence of radius duplication is increased. These effects of the Creeper factor are explained on the basis of competition within the wing primordium for skeleton-forming mesoderm and changed size relationships between organising and responding tissues.—*Author's summary.* (Animal Breeding Abstracts)

LORENZ, F. W., V. S. ASMUNDSON, and **N. E. WILSON.** 1956. [Poult. Dep., Univ. California, Davis.]
TURKEY HYBRIDS *(Meleagris ocellata* × *Meleagris gallopavo.) J. Hered., 47:* 142-146.—The F^1 hybrids produced from eggs laid by domestic (largely Broad Breasted Bronze) ♀♀ inseminated with semen from 2 ocellated ♂♂ were intermediate between the parental species in body weight, plumage colour, and head furnishings. The snood, which is miniature in *M. ocellata,* is well developed in the hybrids, but the fleshy knob of *ocellata* is absent. The beard of the F_1 ♂ is smaller than that of domesticated ♂♂. The voice is similar to that of *ocellata.*

Egg fertility was found to be rather low, but this might have been due in part to extraneous circumstances. The percentage of fertile eggs hatched was not significantly different from that of Broad Breasted Bronze turkeys. The limited results to date suggest that good fertility may be expected in the backcross (F_1 ♂ × Bronze ♀) if adequate amounts of semen are available for insemination. More ♂ than ♀ embryos survived to 20 days of incubation. The ♂ hybrids and the backcrosses showed good viability, but most of the F_1 ♀♀ died before reaching maturity. A hybrid hen inseminated with semen from Bronze ♂♂ laid some fertile eggs, but all were soft-shelled and failed to hatch. The backcrosses

were more docile than the F_1 and tended to resemble domestic turkeys in size and appearance. (Animal Breeding Abstracts)

MacLAURY, D. W., W. M. INSKO, Jr., D. G. STEELE, and **E. T. WIGHTMAN.** 1954. [Kentucky Agric. Exp. Sta., Lexington.]
TURKEY BREEDING INVESTIGATIONS. *Bull. Ky agric. Exp. Sta.*, No. 616: 14 pp.—The work described was concerned with methods of selection within strains for the ideal bird to meet consumer demand: this must grow fast, feed efficiently, have a good finish and few pin feathers at maturity, and yield an attractive dressed carcass.

Finish, keel length and breast area were found by Bywaters and coworkers to be the 3 best measurements for estimating market grade, but as the last of these is not convenient for the av. breeder, the effectiveness of selecting for the other two was tested over a 3-yr. period. Selection for finish and pin feathers, and for keel length relative to shank length was ineffective and the indications were that heritability for these characters was low.

A simplified method of determining breast area was evolved and is described. When tested, there was no significant difference between the results so obtained and those by the usual planimeter method.

Using 5-yr. live weight data from a flock of Small Type White turkeys (2862 birds), an age correction study showed that the daily effects of hatchability date and measuring date on live weight were greater than the daily effects of age. Body weight corrected to a common age of 26 wks. were used to estimate heritability: the unweighted mean of the 2 values estimated for ♂♂ and ♀♀ was 0.2240. A heritability estimate of 0.2572±0.3104 was obtained from body weights of 312 birds actually measured at ages of 25-27 wks. Heritability estimates were made for 6 other body characters, the bone-to-bone measurements showing relatively high heritability while width, finish and pin feather estimates were low. (Animal Breeding Abstracts)

MACLAURY, D. W., and **A. W. NORDSKOG.** (Iowa State Coll., Ames.)
EFFECTS OF INBREEDING ON MORTALITY IN THE DOMESTIC FOWL. *Poultry Sci. 35(3):* 582-585. 1956.—The depression effect of inbreeding on viability in the White Leghorn fowl was studied from data collected over a period of 15 years on 25 inbred lines. Records were available for brooder, range and laying-house mortality on 30,578 inbreds and 16,275 non-inbred chicks. Regressions of per cent mortality on per cent of inbreeding estimated by least squares were 0.33 in the brooder period, 0.15 in the range period and 0.21 in the laying-house period. Differences between lines, years and the interaction of lines x years in rates of mortality were all highly significant.—*A. W. Nordskog.* (Biological Abstracts)

MRAZ, I., and **I. MRAZOVA.** 1955. [Wartime Med. Sch. Czechoslovakia.]
Zamena jaicnogo belka kak metod vegetativnoi gibridizacii ptic.
THE EXCHANGE OF EGG ALBUMEN AS A METHOD OF VEGETATIVE HYBRIDISATION IN BIRDS.—*Zool. Z., 34:* 957-964.—On the 3rd day of incubation White Leghorn and Rhode Island Red hen eggs and Pekin duck eggs were injected with albumen from unincubated eggs, the injected albumen being from the breed or species different to that of the recipient. It is stated that various methods were used and the simplest is described. Mortality was lower and growth was greater in chicks from injected eggs than in the untreated controls. Relative to initial egg weight the weight of young at hatching was greater in the experimental than in the control groups. No abnormal characters were noted. Reference is made to another of the authors' publications on the characters of the 2nd and 3rd generations [no mention is made as to how these generations were obtained]. Some characters of the plumage, beak and wattles of the breed whose albumen was injected were transferred to the experimental chicks. In the injected duck eggs the incubation period was reduced to 26 and 27 days *v.* the normal 28, and in the injected hen eggs it was increased from 21 to 22-23 days. (Animal Breeding Abstracts)

PEASE, M. S.
ANOTHER CASE OF UNEXPECTED BLACK CHICKENS. (Autosex. Annu. 1955, 13-16).—The common plumage patterns in poultry, Black, Columbian, E.G. Light Sussex, and Black Red, *e.g.* Brown Leghorn, are usually said to be inherited as a series of multiple allelomorphs. Experiments at Cambridge have previously shown that this simple scheme does not always hold good. In the present paper another case is described which does not conform. Here a true breeding full Black line has been extracted from the cross Columbian by Black Red. (University of Cambridge)

POESPO, R. S. 1956. Sekitar Peternakan Itik Di Alabio (Kalimantan-Selatan) (Duck-breeding in Alabio-South of Kalimantan) Hemera Zoa LXIII (9-10): 395-429
In the lake areas, where the sago does not get much attention as human food and where the yield of the fisheries is rather abundant as we found in Alabio in the South of Kalimantan, duck-breeding as one source of wealth for the people's economical development and as a foodstock of high value for man, has a wide perspective. *(Author's summ.)*

RAINFORD, A. J. (Land Settlement Assoc. London.)
THE PRACTICAL VALUE OF ARTIFICIAL INSEMINATION TO THE POULTRY INDUSTRY FROM THE DOMESTIC FOWL ANGLE. *World's Poultry Sci. Jour., 12(2):* 137-141. 1956.—The procedure was studied as a means of reducing the spread of infection in contests involving breeding.—*J. B. Christiansen.* (Biological Abstracts)

VIDAL, GEORGES, and **MARC BERNOS.** Hybridation dindon x pintade.
HYBRIDIZATION TURKEY X GUINEA-FOWL. *Compt. Rend. Acad. Agric. France 14(19):* 763-764. 1954.—Characteristics of a 3-year-old offspring from a turkey X guinea-fowl mating is described. It produced eggs resembling those of guinea-fowls. It's weight, 3 kg, was less than a turkey but more than a guinea-fowl. It had dark skin, a horny comb, and it walked like a guinea-fowl. It remained apart from other farm animals. At night it cried at the approach of strange animals or people.—*H. G. Koritz.* (Biological Abstracts)

VOJTISKOVA, M., and **B. KNIZE.** 1956. (Biological Institut, Prague, Czechoslovakia.) (Vzdálené pohlavní krízení perličky, Numida meleagris, s kohoutem, Gallus domesticus.)
DISTANT SEXUAL CROSSING OF A GUINEA-FOWL, NUMIDA MELEAGRIS, WITH A COCK, GALLUS DOMESTICUS. (Ceskoslovenská Biologie, 1956, *V*, *4:* 210-212)—On carrying out distant sexual crossing of a guinea-fowl with a cock, Gallus domesticus, by means of artificial insemination 20 percent fertilized eggs were obtained, with 15 of hatchability. The significance of distant crossing and the possibility of immunological approximation in the sexual process were considered. (Orel)

WILIAMS, CLETIS. (Oklahoma A. and M. Coll., Stillwater), and **W. H. McGIBBON.**
THE YIELDS OF SEMEN AMONG INBRED LINES AND CROSSES OF S. C. WHITE LEGHORNS. *Poultry Sci. 35(3):* 617-620. 1956.—Semen yields were obtained for 77 males of several Wisconsin inbred lines and 2 crosses of S. C. White Leghorns. Semen was collected at weekly intervals for 12 weeks in 2 successive years. Significant differences in semen yields were seen among the several inbred lines as well as among the males within the inbred lines. Repeatability estimates of 0.61 ad 0.42 were obtained for semen yield for data collected both years. Two to 4 weekly collections of semen would give an apparently satisfactory measure of the inherent semen yield of a male. A highly significant correlation of (0.41) was obtained between body weight and semen yields. A non-significant correlation (0.001) was obtained between semen yields and hen-housed egg production.—*Cletis Williams.* (Biological Abstracts)

PHYSIOLOGY

ANGHI, Cs.:
CONSTITUTIONAL CHARACTERIZATION OF SMALL DOMESTIC ANIMALS ACCORDING TO KULESHOV. (A kis háziállatok "Kulesov-féle" alkatjellemzése.) Allattenyésztés, Budapest, 1956. 1. p. 85.—Following the vestige of Kuleshov, author tried to illustrate the economic types of domestic hens and rabbits. For this purpose the data of the slaughter test (feathers and skin, fur with skin, fat, musculature, bones, digesting organs) were projected in a mm scale on an oval figure characterized by the depth and the width of the chest as vertical and transversal axes. The bilateral measures in relation to the width of the animal contributed to the construction of the body. Thus the diagrams give information about the percentual quantities of the various organs. In the individual fowl breeds the data of 24 animals of minimal, maximal and average weights were worked up.

Of rabbit breeds, the following number of grown-up animals was used for a diagram's sake: 30 "Giant", resp. Hungarian Wild; 14 Chincilla; 6 Viennese White mature specimens. This method well illustrates the relations of the depth and width as well as of the edible parts the ratio of meat and fat, and of the nonedible parts the percentual relation of feathers, hairs, bones and bowels. (Hungarian Agricultural Review, 3, 1956.)

ARANEZ, JOSE B., and **CONRADO S. SAGUIN.** (U. Philippines, Quezon City.)
POULARDIZATION OF NATIVE DUCKS. *Jour. Amer. Vet. Med. Assoc. 127(943):* 314-317. 1955.—Ovariectomy is performed at 2 months through an incision between the left 6-7 ribs in an operation similar to caponizing. Greater weight gains were made in poulards and their flesh was superior.—*J. F. Ryff.* (Biological Abstracts)

BENOIT, J., I. ASSENMACHER, and **E. BRARD.** 1955. Evolution testiculaire du canard domestique maintenu à l'obscurité totale pendant une longue durée.
TESTICULAR EVOLUTION IN THE DOMESTIC DUCK SUBJECTED TO TOTAL DARKNESS FOR A PROLONGED PERIOD. *C.R. Acad. Sci.* [*Paris*], 241: 251-253.—From 18 days or from 4-4½ mths. of age Pekin drakes were kept in dark houses for 2½ yrs.; light for necessary operations was supplied by a weak blue light for several mins. at a time. The ♂ ♂ reached full sexual maturity, but not until rather later than the controls in the open air. Testis size reached a maximum and then regressed; cycles in which development and regression occurred became progressively shorter. Complete quiescence did not occur and maximum volume was not again reached. Work is continuing. (Animal Breeding Abstracts)

BENOIT, J., I. ASSENMACHER, and **E. BRARD,** 1956. Etude de l'évolution testiculaire du canard domestique soumis très jeune à un éclairement artificiel permanent deux ans.
TESTICULAR EVOLUTION IN THE DOMESTIC DUCK SUBJECTED TO PERMANENT ARTIFICIAL LIGHTING FOR TWO YEARS FROM AN EARLY AGE. *C.R. Acad. Sci.* [*Paris*], *242:* 3113-3115.—From 18 days of age 4 ♂ Pekin ducks were subjected to 24 hrs. light daily for 2 yrs. All the sexual organs developed, the testes reaching their maximum size at a time not appreciably different from that of the controls under normal lighting. In 2 yrs. 4 cycles of regression and development were completed; the cycles were not as regular as those of the controls but were similar in all 4 ducks. (Animal Breeding Abstracts)

BRADBURY, JOHN. (Collishall Breeding Sta., Norwich, Norfolk, Eng.)
THE PRACTICAL VALUE OF ARTIFICIAL INSEMINATION TO THE TURKEY INDUSTRY. *World's Poultry Sci. Jour. 12(2):* 142-145. 1956.—The procedure is used as a supplement to natural mating when fertility in the Broad Breasted Norfolk White turkeys falls below 90% and when the hens mature before the males. At the end of the

laying season, hens are artificially inseminated every 2-3 weeks.—*J. B. Christiansen.* (Biological Abstracts)

COCK, A. G., and M. CLOUGH.
SUCCESSFUL SKIN HOMOGRAFTS IN INBRED CHICKENS. *(Nature 178:* 136-7, 1956.)—Skin-grafting tests have been made on an inbred line of White Leghorn (the I line, F = 98.91 per cent). A total of 86 homografts of I on I or I on F_1 yielded no typical reactions, and only six homografts failed to survive, compared with seven failures among autografts on the same hosts. The "vigour" of the homografts was, however, on average slightly inferior to that of the autografts. (University of Cambridge)

COLES, R. (Min. Agric., Eng.)
THE INFLUENCE OF THE HEN'S EGG WEIGHT ON HATCHING. *Poultry Sci. 35(4):* 817-822. 1956.—Egg weight in relation to hatchability was studied in a closed flock of White Leghorns of which the mean egg weight was rather low, 55 g, and which was fed on a diet marginal for good hatchability. When egg weights were classified as under 53 g, 53-63 g, and over 66 g, hatchability values of fertile eggs were 71.2, 64.4 and 53.4%, respectively. When egg weights for each bird were classified as below standard, standard, or above standard wt. for the particular bird, figures were 75.3, 64.2 and 62.2%. When the birds were classified as laying eggs, all below 55 g, above and below 55g, and all over 55 g, the figures were 69.9, 58.9 and 59.8%. It is concluded that the highest hatching rate is found in eggs closely approaching the normal weight laid by the individual bird provided her egg weight is not too variable. It is considered unlikely that improvement in flock hatchability would result from discarding for hatching all eggs deviating from the flock mean weight if these eggs are from birds normally laying eggs in that weight range.—*R. Coles.* (Biological Abstracts)

COOPER, D. M. (Houghton Poultry Res. Sta., Huntingdonshire, Eng.)
ARTIFICIAL INSEMINATION IN POULTRY. *World's Poultry Sci. Jour. 12(2):* 131-135. 1956.—Techniques and some results are reviewed.—*J. B. Christiansen.* (Biological Abstracts)

ERAMUS, JAN.
RELATIONSHIP BETWEEN AGE AND BODY WEIGHT IN POULTRY. *Farming in S. Africa 31(360):* 215-216, 218 (1950).—The correlation coefficient (r) is given between adult body weights and chick weights of white Leghorns. Results reveal a relationship between body weight at 2 weeks of age and adult body weight. The analysis also showed the greatest variation at 2 weeks of age with diminishing variation as the birds became older. (Biological Abstracts)

FRAPS, R. M. (U. S. Dept., Beltsville, Md.)
NEURAL BASIS OF DIURNAL PERIODICITY IN RELEASE OF OVULATION-INDUCING HORMONE IN FOWL. *Proc. Natl. Acad. Sci. 40(5).* 348-356. Illus. 1954.—White Leghorns, Rhode Island Reds, and crosses between these breeds were individually caged in laying batteries, under electric lights from 6 a.m. through 8 p.m. with access to feed and water at all times. The usual records of lay at hourly intervals from 8 a.m. through 4 p.m. served as the basis of selecting experimental hens. The 1st, or C_1, ovulation was estimated to occur at 6 a.m., the 2d, or C_2, ovulation at 10:30 a.m. of the following day. The C_1 ovulation of the next sequence (series of ovulations occurring on consecutive days) occurred 43.5 hours after the C_2 ovulation of the preceding sequence. Based on these relationships estradiol benzoate dissolved in corn oil (5 mg/ml) was injected at levels of 1-2.5 mg/hen 14-41 hours before the expected C_1 ovulation and 11-28 hours before the expected C_2 ovulation. The occurrence of normal or suppressed ovulation was determined by palpation for presence or absence of the ovidcual egg. If suppressed, palpation was timed to give approximate information on the hour of the delayed ovulation. The reliability of the palpation method was checked by autopsy on 9 hens 12-14 hours after the occurrence of C_2 ovulations delayed for one day, or 60 hours after administering estradiol benzoate.

The ovaries of these hens were normal, indicating that the estrogen was not causing selective atresia of the next ovulable follicle. 5-10% of the hens selected for C_1 ovulation were found to fail to ovulate, and failure of C_2 ovulation was less frequent, but these deviations should be considered in interpreting the results. Of 88 hens injected with estradiol benzoate before the expected C_1 ovulation, 12 or 14% had suppressed ovulations, and of these, 8 or 67% were delayed by only one day. All delayed C_1 ovulations occurred at or close to the hour of the expected C_1 ovulations, i.e., a delay of 24 hours or some multiple of 24 hours. Of 119 hens treated before the expected C_2 ovulation, 66 or 55% had suppressed ovulations. 45% of these were delayed by only one day, and occurred at 6 a.m. after a delay of 19-20 hours. The effect of estradiol benzoate in suppressing C_1 or C_2 ovulations was independent of the time from injection to normally expected ovulation. Estradiol depropionate and diethylstilbestrol had the same effect as estradiol benzoate in suppressing ovulation. These studies suggest that suppression of ovulation is due to decreased excitability of the postulated neural component of the OIH (ovulation-inducing hormone) release mechanism during the relatively limited hours of normally high excitability. The observation that ovulation, following suppression, occurred during the hours of the 24 when it normally took place, indicated that the neural mechanism exhibited diurnal periodicity in its thresholds of response to excitation hormones. Results of this study are compared with those obtained with rats and ring doves.—*Rosalind Morris.* (Biological Abstracts)

FRAPS, R. M., H. A. SOHN, and **M. W. OLSEN.** (Agric. Res. Service, U. S. Dept. Agric., Beltsville, Md.)
SOME EFFECTS OF MULTIPLE PELLET IMPLANTS OF DIETHYLSTILBESTROL IN 9 WEEK OLD CHICKENS. *Poultry Sci. 35(3):* 665-668. 1956.—One, 2, 4, or 8 diethylstilbestrol tablets (15 mg) were implanted into battery-caged New Hampshire males and females at 9 weeks of age to ascertain the effects of excessive dosages on subsequent reproductive performance. Viability and rates of gain in body weights were not affected appreciably at any dosage. Age at sexual maturity of females (first egg) was somewhat retarded, but not in proportion to dosage levels. Maximum production per laying hen was attained later in treated than in control birds, but compared favorably with that of controls during 5th and 6th months following pellet implantation. Onset of semen production was delayed in treated birds, and subsequently, semen volumes were considerably lower than in controls. The adverse effect on semen volume increased, in general, with increasing dosage. Hatchability was little affected by single pellets, but was appreciably reduced at higher dosages. The effect was more pronounced to about day 180 following pellet implantation than thereafter. Semen was apparently more adversely affected than were eggs. The number of female chicks hatched from eggs of treated females exceeded somewhat the number of males during the 4th-5th months following pellet implantation, but not thereafter.—*R. M. Fraps.* (Biological Abstracts)

GARREN, HENRY W., and **C. S. SHAFFNER.** (U. Maryland, College Park.)
HOW THE PERIOD OF EXPOSURE TO DIFFERENT STRESS STIMULI AFFECTS THE ENDOCRINE AND LYMPHATIC GLAND WEIGHTS OF YOUNG CHICKENS. *Poultry Sci. 35(2):* 266-272. 1956.—The influence of time on the response of young New Hampshires to cold (44° F), hypothyroidism (thiouracil, 0.2%), hyperthyroidism (thyroprotein, 0.03%), and reduced atmospheric pressures (12,000-15,000 feet) was studied. Studies were conducted in which independent groups were subjected to cold for 1, 2, 3 or 4 weeks; hypo- or hyperthyroidism for 3, 6, 9 or 12 days; and reduced pressures for 1, 2, 3, 4, 5 or 12 hours. All periods of exposure to cold caused an adrenal hypertrophy. At the end of the first week, a decrease in thyroid weight was noted, which was followed by an increase in the weight of this gland by the 3d week. Thiouracil administration for 3 or 6 days resulted in an adrenal enlargement. All periods of administration caused a lymphatic involution. By the 12th day, thyroprotein treatment had caused an adrenal hypertrophy. A marked reduction in spleen weight occurred in the group subjected to reduced pressures for only one hour. An increase in adrenal weight

occurred after 5 or 12 hours, while a lymphatic involution was seen following subjection for 4, 5, or 12 hours. All the stress stimuli except hyperthyroidism produced enlargement of the pituitary at some time during the exposure period.—*Auth. summ.* (Biological Abstracts)

GRIMINGER, PAUL, W. D. MORRISON, and **H. M. SCOTT.** (U. Illinois, Urbana.)

EFFECT OF UNHEATED SOYBEAN MEAL ON BLOOD COAGULATION OF CHICKS. *Poultry Sci. 35(4):* 911-915. 1956.—The inclusion of 20% of an unheated sample of hexane-extracted soybean meal into a purified diet did not influence the blood-clotting or plasma prothrombin times of young chicks. Lots receiving the unheated meal responded to supplemental vitamin K in the same way as did the controls. Addition of 0.4 mg of menadione/kg diet did not suffice to induce minimum clotting times.—*P. Griminger.* (Biological Abstracts)

HENDERSON, E. W. 1956. [Dep. Poult. Husb., Michigan State Univ., East Lansing.]

WHICH CHICKS HATCH FIRST—MALE OR FEMALE? *Quart. Bull. Mich. agric. Exp. Sta., 38:* 362-364. —In order to test the popular belief that ♂ chicks predominate in the first 10% of a hatch, the proportion of either sex hatched in four 6-hr. periods from start to end of a hatch was determined with the following results: 0-6th hr. 23 ♂♂, 36 ♀♀; 6-12th hr. 41 ♂♂, 46 ♀♀; 12-18th hr. 40 ♂♂, 38 ♀♀; 18-24th hr. 29 ♂♂, 16 ♀♀. Only in the 4th period was the preponderance of one sex significant, and that barely so. While these results do not disprove the supposition, they suggest that the possibility is unlikely.

When the chicks hatched were considered by breed, there was some variation in the proportion of sexes, but the numbers were too small to allow of any valid conclusion. (Animal Breeding Abstracts)

HUNSAKER, W. G., J. R. AITKEN, and **G. S. LINDBLAD.** (Poultry Division, Central Exptl. Farm, Ottawa, Canada.)

THE FERTILIZING CAPACITY OF FOWL SEMEN AS AFFECTED BY TIME AND TEMPERATURE OF STORAGE. *Poultry Sci. 35(3):* 649-653. 1956.—Experiments (4) were conducted to determine the effect on fertilizing capacity of holding cockerel semen at temperatures from 0°C to 30°C for periods up to 9 hours. Fertilizing capacity was measured in terms of duration of fertility (in days) following a single insemination. Fertility was determined by breaking and examining the eggs macroscopically. Each semen treatment was tested on 14-26 hens, depending on the experiment. Pooled semen obtained from several cockerels was used in all cases. Storage temperatures of 10°C, 15°C and 20°C all gave similar results, although in 5 of 6 comparisons 15°C was slightly superior to 10°C or 20°C. A storage temperature of 30°C caused poor fertility at all holding times, whereas 0°C gave good fertility when held up to 2 hours, but there was a very rapid drop in duration of fertility when the storage period at this temperature was extended. When the semen was held for 9 hours at temperatures of 10°, 15° and 20°C, the average duration of fertility ranged from 2-5 days. Average duration of fertility for the controls (immediate insemination of the fresh semen) ranged from 10-12 days.—*J. R. Aitken.* (Biological Abstracts)

IVANOV, V. G. Razlichnaya chuvstvitelnost samtsov i samok embrionov kur:

DIFFERENT SENSITIVITY OF MALE AND FEMALE CHICK EMBRYOS. *Doklady Akad. Nauk SSSR 100(4):* 829-832. 1955; Referat. Zhur., Biol., 1956, No. 1683. (Translation.).—Sex ratio among dead White Leghorn (270) and New Hampshire (231) chicks was studied. In both cases the death rate of the males (64.4 and 57.6%) exceeded that of the females (35.6 and 42.4%). To determine the time when the differential sensitivity of the sexes in ontogenesis arises, observations on the death of embryos of different ages were carried out; incubation wastes were used. Male and female embryos at 9-11 days die in different numbers, while from the 12th to the 19th day males predominate among the dead embryos. During the last development stage(before

hatching) more females than males die. On the whole the numbers of males and females among the dead embryos are approximately the same. Higher mortality of females before hatching is explained by the fact that they survive unfavorable conditions better than males and survive until the last days of incubation, but do not withstand the last critical period, involving transition to lung respiration. A bibliography and 19 references. (Biological Abstracts)

KING, J. O. (Fac. Vet. Sci. U. Liverpool.)
THE BODY TEMPERATURE OF CHICKS DURING THE FIRST FOURTEEN DAYS OF LIFE. *Brit. Vet. Jour. 112(4):* 155-159. 1956.—Daily recordings on 57 chicks brooded at 90°F indicated that the body temperature of the light breed increased until the 7th day and of the heavy breed until the 12th day. The sexes did not differ. Chicks kept at 105°F showed higher temperatures on 11 of 12 days but on only 5 days was the difference significant.—*K. L. Bullis.* (Biological Abstracts)

KRZANOWSKA, H. (Instytutu Zootechniki w Pulawach, Poland.)
SEASONAL VARIATION IN THE QUALITY OF SPERM IN DOMESTIC FOWL. *Roczniki Nauk Rolniczych 70:* 301-315, 1956.—In summarizing it can be said that seasonal variations in sperm production were distinct but not intense. The low level of sperm production at the beginning of the experiment was due more to the young age of the cockerels, than to the length of the day, as during the following year no decline in the initial value was observed. All curves under investigation (body weight, hemoglobin content, sperm quantity and quality) showed a rise from autumn 1953 in conformance with lengthening of the day. Maxima were already reached in spring (with the exception of the number of spermatozoa produced, the maximum of which was observed in June) and then declined. Only rate of methylene blue reduction, which according to Shaffner and Andrews (1948) correlates with the fertilizing capacity of the spermatozoa, increased again in September after the summer drop. The existence of two maxima of sperm viability, in spring and autumn, is analogous to the course of the sexual cycle in wild birds.

By comparing the rate of methylene blue reduction with the fertility percentage of eggs (Kaufman and Gancarcyzk 1954), it can be assumed that the high fertility percentage in spring, which declines in summer and increases in September, is to a high degree caused by cocks, while mainly hens are responsible for the very sharp decline observed toward the end of autumn. (Author)

LAKE, P. E. [1956.] [Poult. Res. Centre, Edinburgh.]
A RETARDING FACTOR IN THE PROBLEM OF FOWL SEMEN STORAGE. *Pap. 3rd int. Congr. Anim. Reprod.* [*Camb.*], 1956, Sect. *3:* 104-106. [*French summary.*] 1933—In view of the structure and mode of erection of the copulatory organ of the cock, it is doubtful whether the blood exudate of the engorged lymph folds and vascular bodies is a normal component of true fowl semen. It is only obtained during artificial ejaculation as a result of squeezing the copulatory organ. Evidence is given to suggest that it is one of the underlying factors contributing to the difficulty of storing fowl semen *in vitro*, and that it warrants further consideration in this aspect.—*Author's summary.* (Animal Breeding Abstracts)

LANDAU, L., and **A. SPRONC.** 1956. (Research Poultry Institut, Ivanka, Czechoslovakia.) Učinok periodického striedania hlavnych fysikálnych faktorov prostredia na rast a zdravotny stav kurčiat.
THE INFLUENCE OF THE PERIODICAL CHANGES OF BROODINGS FACTORS UPON THE GROWTH AND CONDITION OF CHICKENS. *Polnohospodárstvo,* 1956, *II,6:* 509-529.—Experimental brooding of Rhode-Island chickens. The chickens were divided in 4 groups, each of 180 chickens. In the first group changed the temperature and the light. A special electrical brooder/the picture in the paper/in the room, where was lower temperature by 7-16%. In the second group the chicken were brooded on heated floor in constant temperature and lighting, in the third group under the infra red bulbs and in the fourth

group under the normal electrical brooder with the constant temperature in the room.

The weight of chickens after 40 days were: in the first group 320.8 g, in the second 264,3g, in the third group 294,3 and in the fourth one 282,9g. Hens of the heaviest first group laid in the first year also more eggs than the other hens. Brooding costs were lower by about 25% in the first group under the proposed brooder. (Orel)

LORENZ, F. W., N. E. WILSON, and **V. S. ASMUNDSON.** (U. California, Davis.)

EFFECT OF LONG INTERVALS BETWEEN COLLECTION ON SEMEN PRODUCTION OF TURKEY MALES. *Poultry Sci. 35(4):* 823-824. 1956.—Data on the effect of spacing collections of semen 1, 2 and 4 weeks apart were obtained from 11 groups of 3 full brothers. Increasing the interval to 2 and 4 weeks reduced volume significantly below that of the birds sampled weekly; the sperm concentration of the semen was not affected. Ten mated birds were removed from the breeding pens each Friday afternoon and sampled the following Monday for 13 weeks. These samples did not differ significantly in volume and concentration from those of unmated full brothers, sampled once weekly on the same days.—*Auth. summ.* (Biological Abstracts)

LUCAS, ALFRED M., and **EFFIE M. DENINGTON.** (U. S. Regional Poultry Res. Lab., East Lansing, Michigan.)

MORPHOLOGY OF THE CHICKEN LIVER. *Poultry Sci. 35(4):* 793-806. Illus. 1956.—Survey of the literature revealed that the morphology of the avian liver was never described, except to report the number of lobes and subdivisions and to emphasize the great variability in shape. The purpose of this paper was to describe this variability and put it on a statistical basis. The livers, fixed in Zenker's fluid, came from 128 Single Comb White Leghorn chickens; from one hatch and from one inbred line. The following characters were studied: length and width of right and left lobes; length + width, and width divided by length; length + width of right lobe, divided by length + width of left lobe. This last, plus body weight and liver weight, was not significantly different for family or for sex at this age. Another character studied was the position of the distal tip of the right lobe. It was divided into 5 types, types 2 and 3 being most common. In another character, the medial extension of the right lobe was greater than the lateral extension (125 of 128). There may be 2 or 3 such extensions, the former number being most common. Measurements of distances between tips were given. The direction of the lateral margin to the medial margin fell into 3 types, nearly equally distributed in number. The cephalic-medial angle of the right lobe was divided into 3 types; most of the individuals fell into the right angle type or into the type having a lip-like protrusion across the mid-line. Five types were set up for the greatest point of extension of the left lobe. Most often it was closer to the mid-line than to the lateral margin. Five types were set up for the position of the longitudinal cleft that partially divides the left lobe. Eighty-two out of 128 fell in type 3, the middle of the series. Five types were set up for the extent of the cleft. Again, most of the cases fell in type 3. The shape of the lateral margin was set up in 2 groups of types. The shape of medial division of the left lobe was divided into 5 types; type 4 with parallel sides was most common. Central divisions of right and left lobes were studied in 2 categories and divided into 3 types each. A discussion of a "typical" chicken liver was presented. As an arbitrary standard all shape variations within 95% fiducial interval should be considered typical.—*Alfred M. Lucas.* (Biological Abstracts)

McCARTNEY, MORLEY G. (Pennsylvania State U., University Park.)

REPRODUCTIVE PERFORMANCE IN BROODY AND NON-BROODY TURKEYS. *Poultry Sci. 35(4):* 763-765. 1956.—The egg production, fertility and hatchability records of the 1950 to 1955 flocks of pedigree-mated White Holland turkeys were analyzed to determine the effectiveness of selection on the incidence broodiness and the relation of broodiness to reproductive performance. Incidence of broodiness was effectively reduced by trapnesting and selecting for breeders only

those poults that were progeny of non-broody dams. There was no difference in fertility and hatchability between broody and non-broody females. Egg production and poult production averaged 11% and 6 poults/dam more, respectively, for the non-broody females.—*M. G. McCartney.* (Biological Abstracts)

MORENG, ROBERT E., and **REECE L. BRYANT.** (North Dakota Agric. Expt. Sta., Fargo.)

BODY WEIGHT GAINS AND DRESSING LOSS AS AFFECTED BY BREED IN DIETHYLSTILBESTROL TREATED MALES. *Poultry Sci. 35(3):* 672-674. 1956.—Diethylstilbestrol pellet (12 mg) implants were effective in increasing body weight gains over a 4-week period in 8-month old male chickens of 4 breeds or varieties studied. There were no marked differences in breed response to the treatment and no increase in processing loss due to extra visceral fat deposition in treated birds as compared with untreated controls of the same age and breed.—*R. L. Bryant.* (Biological Abstracts)

MORENG, ROBERT E., and **REECE L. BRYANT.** (North Dakota Agric. Exptl. Sta., Fargo.)

THE RESISTANCE OF THE CHICKEN EMBRYO TO LOW TEMPERATURE EXPOSURE. *Poultry Sci. 35(4):* 753-757. 1956.—Chicken embryos in various daily stages of incubation were exposed to a still-air environment of 50 to 55°F for periods of exposure ranging from 19 to 120 hours. At the 19-hour exposure period embryos, through 11 days of incubation, withstood the treatment and a limited number hatched. However, those treated after the fourth day show a drastic reduction in hatchability. Increasingly longer exposures reduced the age limit at which complete lethal effects were obtained. Only one-day embryos were able to withstand the 120-hour exposure.—*R. L. Bryant.* (Biological Abstracts)

MORENG, ROBERT E., REECE L. BRYANT, and **DAVID G. GOSSLEE.** (North Dakota Agric. Exp. Sta., Fargo.)

GONAD AND COMB RESPONSE OF MATURE MALE CHICKENS TO DIETHYLSTILBESTROL AS INFLUENCED BY BREED AND DOSAGE. *Poultry Sci. 35(2):* 476-482. 1956.—Mature male chickens of various breeds were implanted with diethylstilbestrol pellets. A minimum dose of 12 mg resulted in a significant decrease in testis size, comb area and comb weight over a four-week treatment period. Response to the treatment varied by breeds. Increased dosage level and repeated administrations caused an increased response to the treatment although not proportionately. Younger birds responded more readily to the dosage levels used. There was no measured influence because of inbreeding.—*R. L. Bryant.* (Biological Abstracts)

MOUNTNEY, G. J., F. A. GARDNER, and **R. A. GAYVERT.** (Texas Agric. Expt. Sta, College Station.)

THE INFLUENCE OF ELECTRIC SHOCK ON TURKEY BLEEDING. *Poultry Sci. 35(3):* 669-671. 1956.—Broad Breasted Bronze and Beltsville Small White Turkeys were shocked with from 0 to 810 volts and the rate and amount of blood loss determined. Birds receiving electric shock bled slower than those not shocked. When the birds were allowed sufficient time for bleeding to stop, no significant differences were observed between those shocked and those not shocked. Tables showing the amount of blood lost as a percent of live body weight are included.—*G. J. Mountney.* (Biological Abstracts)

NICHOLS, C. W. Jr. (U. California, Berkeley), **M. D. SIPERSTEIN, W. GAFFEY, STUART LINDSAY,** and **I. L. CHAIKOFF.**

DOES THE INGESTION OF ALCOHOL INFLUENCE THE DEVELOPMENT OF ARTERIOSCLEROSIS IN FOWLS? *Jour. Exptl. Med. 103(4):* 465-475. 1956.—The effect of alcohol ingestion upon the development of naturally occurring and stilbestrol-induced ateriosclerosis was studied. In 2 experiments, a 15% ethyl alcohol solution was used for drinking purposes, and in a 3d experiment wine containing 12% of it

was given. The caloric intake of both food and alcohol was carefully controlled by pair-feeding, a glucose solution being used for drinking in the control birds. A total of 224 cockerels was studied, and the period of observation for each experiment lasted 12 months. The degree of arteriosclerosis in the thoracic and abdominal aortas was determined grossly and microscopically. The gross gradings were subjected to a critical statistical analysis, which yielded no evidence that alcohol or the wine used had affected the degree of gross arteriosclerosis or lipid infiltration.—*Authors.* (Biological Abstracts)

NOVIKOV, B. G., E. A. MOSKOV, and A. N. ABRAZEI, 1956. [Inst. Zool., Acad. Sci., Ukrainian S.S.R.] O značenii različnogo svetovogo rezima v roste i razvitii ptic.

THE IMPORTANCE OF DIFFERENT LIGHT REGIMES ON THE GROWTH AND DEVELOPMENT OF BIRDS. *Dokl. Akad. Nauk SSSR, 107:* 488-491.—In 1954-55 at a state farm in the Stalin Province 100 White Leghorns and 60 Pekin ducks were subjected to 16 hrs. light and 8 hrs. darkness per day (1-phase day) from 20 days of age for 15 mths., and a further 100 W. L.s and 60 Pekin ducks were subjected to 2 periods of 8 hrs. light + 4 hrs. darkness per day (2-phase day). From 20 to 120 days the growth of the 2-phase day ♂ and ♀ fowls was greater than that of the 1-phase day ♂♂ and ♀♀; the growth of ♂ and ♀ ducks was not appreciably different in the 2 groups. In W.L.s testis and ovary weights were greater in the 1-phase day than in the 2-phase day group. In ducks ovary weight was not appreciably different in the 2 groups; testis weight is not recorded. The thymus did not reach as great a weight and regressed earlier in 1-phase day than in 2-phase day fowls; there was no appreciable difference between ducks in the 2 groups. Pullets came into production 7 days earlier, and ducks 5 days earlier in the 1-phase day than in the 2-phase day groups. In 12 mths. production averaged 142.3 and 119 eggs in the 2 groups of pullets, and in 10 mths. it averaged 132.6 and 96.7 eggs in the 2 groups of ducks. (Animal Breeding Abstracts)

OLSEN, MARLOW W., and STANLEY J. MARSDEN. (U. S. Dept. Agric. Res. Center, Beltsville, Md.)

PARTHENOGENESIS IN EGGS OF BELTSVILLE SMALL WHITE TURKEYS. *Poultry Sci. 35(3):* 674-682. Illus. 1956.—A total of 5930 eggs laid by 81 virgin and 22 non-mated Beltsville Small White young turkeys were incubated for 9-10 days, then examined for evidence of parthenogenesis. Approximately 20% of all eggs examined showed a type of development where only embryonic membranes formed, 1.2% contained blood in addition to membranes, while 0.7% of all eggs examined contained embryos. A total of 44 embryos were encountered which attained various stages of development varying in size from that of a normal 2-day to a fully formed embryo. One parthenogenic poult succeeded in emerging from the shell unaided and lived approximately 18 hours. Average incidence of parthenogensis varied considerably between eggs of different families. A slight tendency for a higher incidence of parthenogenesis was noted where virgin hens were allowed direct contact with vasectomized males as compared to eggs from hens confined to pens where no male was present.—*M. W. Olsen* (Biological Abstracts)

POTSUBAY, J.

THE INFLUENCE OF TEMPERATURE AND VAPOUR CONTENT ON THE WINTER EGG PRODUCTION. (A hömérséklet és páratartalom hatása a téli tojástermelésre.) Állatenyésztés, Budapest, 1956, 1. p. 77.

Author examined in the experimental stables of the Chair for Veterinary Science at the University for Agricultural Sciences the influence of temperature and vapour content on the winter egg production of hens and established the following facts: the egg-production of all three experimental stables decreased only at a temperature of lower than +1.5°C. Consequently the ventilation of stables in case of a proper adaptation also in the winter season may be permitted up to such a

temperature, and this way a more natural keeping may be maintained.

The evenness of egg production changed with the fluctuation of temperature and it was greatest in that stable that showed the largest differences in temperature. In general the change of temperature has a favourable influence on egg production, too great fluctuations, however, cause a decrease in the production. With regard to the influence of relative vapour content on egg production it may be stated that the higher temperature and humidity of the air hinder the exchange of gas and thermo-regulation and this has also an effect on ovulation.

A smaller fluctuation of the absolute vapour content influences the production to a small extent. The laying hens are much more sensitive towards the changes of the vapour content of temperature. Consequently minor grade changes in the temperature may exist, vapour contents, however, must be even. (Hungarian Agricultural Review, Vol. 3, 1956)

SHERWOOD, D. H., and T. T. MILBY. (Larro Res. Farm, General Mills, Indianola, Iowa.)

EFFECT OF DAY OLD DEBEAKING ON FERTILITY IN MALE CHICKENS. *Poultry Sci. 35(3):* 731-733. 1956.—In a test with New Hampshire male chickens it was found that birds with severely deformed beaks were able to mate as satisfactorily as those with normal beaks. The deformities were the result of day old debeaking.—*Auth. summ.* (Biological Abstracts)

SHIRLEY, H. V. Jr., and A. V. NALBANDOV. (U. Illinois, Urbana.)

EFFECTS OF NEUROHYPOPHYSECTOMY IN DOMESTIC CHICKENS. *Endrocrinology 58(4):* 477-483. 1955.—Neurohypophysectomy in immature female chickens had no effect on growth rate, amount of feed consumed and the weights of the thyroids, adrenals, ovary or oviduct. When this operation was performed in mature laying hens, loss in body weight and cessation of ovarian function was attributed to surgical stress. After recovery from the latter, body weights returned to normal, ovulation and ovipostion occurred at the same rate as they did in unoperated controls. The possibility remains that oxytocin is essential in initiating expulsion of the egg from the shell gland but in neurohypophysectomized birds this hormone may come from the hypothalamus. Neurohypophysectomy resulted in a significant increase in the number of red blood cells (per mm^3) and led to marked polydipsia and polyuria. The latter could be controlled by Pitressin but compete refractoriness to this hormonal preparation occurred remarkably rapidly. i.e., after 2-8 injections.—*Authors.* (Biological Abstracts)

SMITH, ARTHUR H., T. S. HAGE, L. M. JULIAN, and D. M. REDMOND. (U. California, Davis.)

THE EFFECT OF X-IRRADIATION OF THE OVIDUCT ON EGG PRODUCTION AND EGG QUALITY IN THE FOWL. *Poultry Sci. 35(3):* 539-545. Illus. 1956.—The effect of X irradiation of the exposed oviduct on the production and quality of eggs is reported. Inhibition of albumin formation is a logarithmic function of the radiation dosage. The quality of the broken-out eggs (by the USDA scoring system) decreased following irradiation, as a logarithmic function of the decrease in albumin weight. The general appearance of eggs laid after irradiation was similar to that reported for eggs laid after partial resection of the oviduct, or after respiratory disease.—*A. H. Smith.* (Biological Abstracts)

STUTTS, ENSEL C., W. E. BRILES, and H. O. KUNKEL. (Texas Agric. Expt. Sta., College Station.)

BLOOD GLUTATHIONE LEVELS AND EGG PRODUCTION IN INBRED LINES OF CHICKENS. *Poultry Sci. 35(4):* 727-728. 1956.—The reduced glutathione levels in bloods of 76 mature inbred White Leghorn females in egg production were significantly and negatively correlated with subsequent egg production. The correlations range from -0.27 to -0.42. On a within-line basis the glutathione-hemoglobin ratio appeared to be more indicative of egg production than glutathione alone. A genetic correlation between glutathione and egg production is suggested.—*H. O. Kunkel.* (Biological Abstracts)

STUTTS, ENSEL C., WARREN JOHNSON, W. E. BRILES, and **H. O. KUNKEL.** (Texas Agric. Expt. Sta., College Station.)
VARIATIONS IN REDUCED GLUTATHIONE IN BLOODS OF INBRED LINES OF CHICKENS. *Proc. Soc. Exptl. Biol. and Med. 91(1):* 60-63. 1956.—Significant correlations were obtained between successive reduced glutathione (GSH) determinations, both in the same males and same females, thus indicating a high degree of constancy in level in individual chickens. The blood level of GSH was determined in 162 mature males of 3 age groups from 3 inbred lines of White Leghorns. Age was not a significant factor, but one line had a highly significantly lower GSH level than the other 2. Differences between levels in females in the 3 lines were highly significant statistically. Females had much lower GSH levels than the males, also much lower hemoglobin content and red cell volume. Since the source of GSH is almost wholly the red cells, the difference in GSH level between males and females within a line could be attributed to relative numbers of red cells. Line differences apparently result from different concentrations of GSH within the red cell. The data indicate that the GSH concentration within the erythrocytes of mature chickens is to a large extent genetically controlled.—*Authors.* (Biological Abstracts)

SZILVASSY, I:
REARING CHICKS WITH INFRA-RED IRRADIATIONS. (Csirkenevelés infravörös sugarakkal.) *Magyar Allattorvosok Lapja, Budapest,* 1956, 5. pp. 157-162.—Experiences made during three years in connection with rearing 50,000 chickens are described by the author. Chicks reared under infra-red lamps had a 20 per cent higher weight increase and showed a quicker feathering than the control stock. Losses during rearing were, on the average, 2.66 per cent less than among the control chicks reared under an electric or stove brooder. Under the influence of infra-red irradiation the erythrocyte count, the haemoglobin content and the haemotocrit value were increasing. The infra-red irradiation had no hindering effect on the growth of the examined bacterial strains (Salmonella gallinarum and Thompson, Erysipelothrix rhusiopathia, Escherichia coli and gram-positive streptococci).
Based on his observations the author is of the opinion that rearing chicks under infra-red irradiation gives better results than any other method of rearing by means of brooders. (Hungarian Agricultural Review, 3, 1956.)

URBAN, W. D. (Kimber Farms, Inc., Niles, Calif.)
UNABSORBED EGG YOLK IN CHICKS. *Jour. Amer. Vet. Med. Assoc. 127(942):* 233-235. 1955.—No correlation between body weight and unabsorbed yolk weight was noted when chicks were killed at weekly intervals up to 72 days. Withholding feed and water after hatching did not hasten absorption of yolk. Unabsorbed yolks were observed in apparently healthy males up to 2 years of age.—*J. F. Ryff.* (Biological Abstracts)

WAWRZYNIAK, MAREK. (Zaklad Anat. Prawidlowej zwierzat Wydzialu Wet. UMCS, Lublin, Poland.) Cytologiczne proby wykrycia zaleznosci processu spermatogenezy od witaminu C u kura domowego.
CYTOLOGIC TESTS IN THE DETERMINATION OF THE DEPENDENCE OF THE PROCESS OF SPERMATOGENESIS ON VITAMIN C IN THE DOMESTIC COCK. *Ann. Univ. Mariae Curie-Sklodowska Sect. DD- Vet. Sci. 8(11):* 165-180. Illus 1953. [1955].—Native Polish (green leg) cocks (20) with ages varying from 14 to 56 days were injected with vitamin C and the oldest group compared with controls. Results obtained suggested that an acceleration of spermatogenesis takes place only if injection takes place when spermatogenesis has already started. In the green legs it appeared to be the age of 8 weeks.—*L. I. Hallay.* (Biological Abstracts)

WILCOX, F. H. Jr., (Cornell U., Ithaca, N. Y.)
FACTORS INFLUENCING THE LYSOZYME LEVEL OF HEN'S

EGG WHITE. *Poultry Sci. 35(2):* 278-284. 1956.—An analysis of 7 eggs laid at 6 or 8 week intervals by White Leghorns in their first laying year showed a substantial decrease in lysozyme concentration, which was partially associated with an increase in egg weight. This decrease was largely erased at the start of the second laying year, which suggests that the decrease in lysozyme concentration with time is an effect of season rather than age of the hen. A positive regression of lysozyme concentration on egg weight within hen and time was demonstrated. The repeatability of lysozyme concentration of eggs laid between approximately 10 and 12 months of age was approximately 0.7. Statistically significant differences were shown between 12 strains but not between 4 breeds studied.—*F. H. Wilcox, Jr.* (Biological Abstracts)

WILWERTH, A. M. (Universidade Rural, Belo Horizonte, Brazil.)
THE INFLUENCE OF THYROPROTEIN ON SPERMATOGENESIS IN THE DOMESTIC FOWL. (Hipertireoidismo e sua influencia sôbre a produčao de semen no galo doméstico.) *Arq. Esc. Sup. Vet. (Brazil) U.R.E.M.G., Vol. 5, 1952:* 34-43.—The results obtained in this experiment showed that thyroprotein when given as 0.04% of the feed is able to improve spermatogenesis in both young and old roosters. We obtained an increase in semen volume, sperm concentration and consequently, in the total number of sperm. The results from young roosters are more consistent than in the old ones.

Higher levels of thyroprotein seemed to have a depressing effect on spermatogenesis, as can be seen in the data obtained from group C of the young roosters. We observed a decrease in semen volume, sperm concentration and consequently, in the total number of sperm in this group.

Based on the data of this experiment we can come to the following conclusions:
1. Thyroprotein, when given as 0.04% of the ration produced an increase in spermatogenesis of young roosters. As compared to control birds both semen volume and sperm concentration increased to some extent with the result that the total number of sperm per ejaculate increased rather markedly. In older roosters similar but less pronounced trends were observed.
2. Thyroprotein, when given at the higher levels of 0.08% atnd 0.16% of the ration, depressed semen production and the total number of sperm decreased markedly. (Author)

WOOD-GUSH, D. G. M. (Poultry Res. Centre, Edinburgh.)
POULTRY BEHAVIOR. *World's Poultry Sci. Jour. 12(2):* 126-127. 1956.—Deficient sexual vigor of cockerels is not related to lack of testicular hormone, nor to potential peck order. Body size of the cockerel influences mating behavior of the hen. Nesting behavior, cannibalism, and feeding behavior are commercially important problems of psychology.—*J. B. Christiansen.* (Biological Abstracts)

ZULIANI, T. and **S. MALIGHETTI.** La castrazione ormonale nella produzione del pollo da carne.
HORMONE CASTRATION IN THE PRODUCTION OF TABLE POULTRY. *Zootec. Vet., 1956, 11,* 196-222. [Ist. Sper. Ital. "L. Spallanzani", Milan.] English, French and German summaries.

A pellet of stilbene (Werner Strickner) supplying 25 mg. diethyldioxystilbene dipropionate was implanted subcutaneously in the inner surface of the left wing of 2 Leghorn cockerels 30 days old, and 2 similar birds were left as untreated controls. The birds were weighed every 3 days and killed after 38 days. Feed intake was recorded.

Weight gains were not increased by the hormone, and efficiency of feed utilisation was reduced. The fat of treated birds was paler than that of controls, and they had more visceral fat, and larger and paler livers. The legs were not better developed or heavier. Combs and wattles and testes were greatly reduced in treated cockerels, and the cloaca was enlarged. Histological changes were found in the testes, comb, thyroid, thymus and cloaca, but the pituitary and adrenals were not affected.

One Leghorn cock 12 months old was implanted with 50 mg. hormone in the same way as the young cockerels, and a similar bird was kept as control. The birds were killed after 38 days and studied as before. Liveweight gain of the treated bird was 10 times that of the control, and efficiency was improved. The effect of treatment on fat, comb and wattles, liver, testes and cloaca was similar to that in young birds. The histological changes were also similar to those seen in the young birds, but the changes in the testes were not so complete, and the pituitary also showed some differences between the treated and the untreated cocks. (Nutrition Abstracts and Reviews)

NUTRITION

AMSCHLER, J. W., H. NOWAK, and **M. SCHWARZ.** Futterungsversuch mit Procain-Penicillin bei Legehennen.
FEEDING EXPERIMENTS WITH PROCAINE PENICILLIN FOR LAYING HENS. *Bodenkultur, 1956, 8,* 429-432. [Inst. Tierzucht Hochsch. Bodenkultur, Vienna.] English summary.

For 8 months in 1953-54, 2 groups each of 220 laying hens, of which about 3/4 were pullets and the rest 2-year-olds, New Hampshires, Brown Leghorns and crosses, were fed as follows: morning grain mixture (barley 50, wheat 30, maize 20) and sprouted oats; midday, steamed potatoes and laying meal; evening, grain mixture. The laying meal consisted of barley, oats, maize, wheat bran or screenings 20 each, fishmeal and dried yeast 7.5 each, chalk 4 and charcoal 1 per cent. They had water, and occasionally buttermilk, and access to a run of 2500 sq. m. Excluding the run and the buttermilk, the ratio of digestible protein to total nutrients was 1:6.4 and only 2.6 per cent of the protein was of animal origin. One group had procaine penicillin added to the laying meal at the rate of 3.6 g. per 1000 kg.

The treated and untreated groups, respectively, laid in all 19,923 and 15,646 eggs, or 90.6 and 71.1 per hen, and monthly analyses showed an increasing difference between the groups. It is stated that the eggs were no smaller and that utilisation of feed was 22 per cent better in the group given procaine penicillin.—*W. M. Deans.* (Nutrition Abstracts and Reviews)

ANDERSON, J. O., and **C. I. DRAPER.** (Utah State Agric. Coll., Logan.)
PROTEIN SUPPLEMENTS FOR LAYING RATIONS HIGH IN WHEAT. *Poultry Sci. 35(3):* 562-566. 1956.—Pens (26) of 30 laying hens each were used in 2 experiments to determine whether substituting corn gluten meal for part of the soybean oil meal in a high wheat ration would improve the hens' performance. Corn gluten meal is relatively rich in leucine. When 3% corn gluten meal replaced soybean oil meal, egg production averaged 3 percentage points higher and feed required per dozen eggs averaged 6.8% less. Mortality was slightly lower also. Addition of 0.3% L-leucine (technical) to a high wheat laying ration, increased egg production 3 percentage points and body weight gain 50 g. Feed consumption per dozen eggs was reduced.—*J. O. Anderson.* (Biological Abstracts)

BALLOUN, S. L. (Iowa State Coll., Ames.)
CHOLINE AND TALLOW IN BREEDER HEN DIETS. *Poultry Sci. 35(3):* 737-738. 1956.—A dietary choline level of 500 mg/lb. was adequate for high hatchability of eggs. Hatchability was depressed by 4% tallow in a low-choline diet, but was not affected when the diet contained 500 mg/lb. choline. (Biological Abstracts)

BALLOUN, S. L., and **R. E. PHILLIPS.** (Iowa State Coll., Ames.)
GRIT FEEDING AFFECTS GROWTH AND FEED UTILIZATION OF CHICKS AND EGG PRODUCTION IN LAYING HENS. *Poultry Sci. 35(3):* 566-569. 1956.—Three types of grit (grey granite, red quartzite and sand) were equally effective in improving growth and

feed conversion of chicks and egg production and efficiency of production of adult hens. Adding grit to the diet of hens did not affect egg-shell thickness.—*S. L. Balloun.* (Biological Abstracts)

BERG, LAWRENCE R., and GORDON E. BEARSE. (Western Washington Exptl. Sta., Puyallup.)

THE EFFECT OF WATER-SOLUBLE VITAMINS AND ENERGY LEVEL OF THE DIET ON THE PERFORMANCE OF LAYING PULLETS. *Poultry Sci. 35(4):* 945-951. 1956.—A study was made of the effect of increasing the level of B-vitamins in 2 laying rations containing approximately 1148 and 1331 calories of metabolizable energy per pound. The investigation was conducted with 2 widely divergent breeds of chickens, a meat type strain of New Hampshires and a high producing strain cross of White Leghorns. With both breeds energy level of the diet did not affect rate of lay, mortality, hatch of fertile eggs, rate of growth of progeny, egg weight or quality of egg shells. Feed efficiency of egg production, and gain in body weight were best on the high energy diet. Additional B-vitamins had no effect with either breed in respect to rate of growth of progeny, color of egg yolks, strength of shells or quality of albumen. They did, however, increase body weight gains and egg weight, and tended to decrease egg production, calculated on a bird day basis, and to decrease hatchability of fertile eggs.—*Auth. summ.* (Biological Abstracts)

BERTOK, L.

THE COMPOSITION AND NUTRITIVE VALUE OF NETTLES. (A csalán összetétele és tápláóértéke.) *Magyar Allatorvosok Lapja, Budapest, 1956,* 5, pp. 162-167.

According to the author's examination the nettle, Urtica dioica L., contains 5 to 6 per cent raw protein as a fresh plant and 23 to 24 per cent in its dried hay of which 70 per cent is true protein. The digestibility of proteins in vitro is fairly good. The raw fat content of the fresh plant is 1 to 1.2 per cent and that of the hay 4.8 to 8.1 per cent and thus substantially higher than that of other plants. Its crude fibre content varies, according to the vegetation period, from 2 to 28.9 per cent. The content of N-free extractible matters is 27 to 33.5 per cent consisting mostly of easily digestible carbohydrates. The content of ashes is 12.5 to 18.5 per cent containing 25.4 to 29.5 per cent CaO, 7.8 to 9.3 per cent P_2O_5, 6.5 to 7.4 per cent MgO and 6.3 per cent FeO. The nutritive value of the fresh plant, expressed in starch equivalents, is 12 to 13.5 kg and that of dried hay 42 to 45.5 kg. The nettle is rich in vitamins and provitamins. Its carotene content is, in may 300 to 320 mg per 1000 g dry matter. It contains 0.16 to 0.64 mg per cent vitamin K_1, 20 60 60 mg vitamin C and besides this, a considerable amount of chlorophyll (2.1 to 3.7 per cent), folic acid and xanthophyll. Thus the composition of nettle is well in accordance with the practical observation according to which it has a favourable influence on the growth of young animals. Therefore, it is recommendable to use nettle for feeding animals, especially ducks and piglets, not only in years scanty in fodder, but at some other time as well. (Hungarian Agricultural Review, 3, 1956.)

BOSSHARDT, DAVID K., JESSE W. HUFF, and RICHARD H. BARNES. (Merck, Sharp, and Dohme Res. Labs., West Point, Pa.)

EFFECT OF BROMINE ON CHICK GROWTH. *Proc. Soc. Exptl. Biol. and Med. 92(1):* 219-221. 1956.—A growth response to trace additions of bromine to a semi-synthetic diet was seen in chicks. In some experiments chicks will also show a growth response to the addition of a variety of natural feed products including whey. It is suggested that part of the growth response to such natural materials may be due to the presence of bromine. Furthermore, since these natural products do not always give positive growth increments, appropriate controls must always be included in tests that are designed to evaluate the significance of the bromine effect.—*Authors.* (Biological Abstracts)

BRANION, H. D., D. C. HILL, and **H. G. JUKES.** (Ontario Agric. Coll., Guelph, Canada.)
EFFECT OF AN ANTIBIOTIC ON EGG PRODUCTION. *Poultry Sci. 35(4):* 783-789. 1956.—Chlortetracyline, at levels of 10 and 100 ppm in an all-mash ration, fed to duplicate groups, each consisting of 48 heavy breed pullets, in laying batteries, improved egg production over a 6 month period. The production of the groups receiving 100 ppm was significantly greater than that of the controls, but it was not significantly greater than that of the groups receiving 10 ppm, nor was the production of the latter groups significantly greater than that of the controls. The birds suffered a mild respiratory infection for about 6 weeks during the experiment, and the results support the suggestion that high level antibiotic feeding increases egg production under stress conditions.—*H. Branion.* (Biological Abstracts)

BRIGGS, G. M. (Natl. Insts. Health, Bethesda, Md.)
INADEQUACY OF CERTAIN SALT MIXTURES USED IN STUDIES OF UNIDENTIFIED GROWTH FACTORS FOR CHICKS. *Poultry Sci. 35(3):* 740-742. 1956.—Calculation of salt mixtures used in certain recent chick experiments on unidentified factors shows them to be incomplete as compared with National Research Council standards. Even though serious deficiencies may not exist, studies on unidentified factors made with inadequate levels of minerals are open to question. —*G. M. Briggs.* (Biological Abstracts)

BRIGGS, G. M., and **M. R. SPIVEY FOX.** (Natl. Insts. Health, Bethesda, Md.)
VITAMIN A DEFICIENCY IN CHICKS PRODUCED BY ADDING HIGH LEVELS OF BENTONITE TO SYNTHETIC DIETS. *Poultry Sci. 35(3):* 570-576. 1956.—Bentonite, a naturally occurring clay with adsorptive properties, caused a deficiency of vitamin A in chicks when fed at a level of 2 to 3%, or higher, in a synthetic diet otherwise containing ample amounts of vitamin A in unstabilized form. Both Na and Ca bentonites were active in this regard. All signs of deficiency were prevented by the use of stabilized vitamin A, by higher levels of vitamin A or carotene, or by injected vitamin A. The particle size of the bentonite was a factor in the development of vitamin A deficiency signs. When the bentonite was 90 mesh or coarser, no untoward symptoms were noted unless very high levels were fed (20%). The presence of fat in the synthetic diet may also have been a factor in the destructive action of bentonite. Chemical analysis of the synthetic diet indicated that there was appreciable disappearance of vitamin A in the presence of bentonite. No evidence was found that bentonite was not acceptable for use in practical rations at the levels commonly used in pelleted feeds (2.5% or less). At a much higher level (20%) growth and feed efficiency decreased.—*G. M. Biggs.* (Biological Abstracts)

BURNS, M. J., and **W. D. SALMON.** (Alabama Polytech. Inst., Auburn.)
EFFECT OF DIETARY COBALT ON GROWING CHICKS AND RATS. *Jour. Agric. and Food Chem. 4(3):* 257-259. 1956.—Experiments were conducted to determine the effect of dietary Co on the growth of chicks and weanling rats fed diets with and without adequate choline and vitamin B_{12}. When Co was added at the rate of 12 mg/kg to a diet deficient in vitamin B_{12} and low in choline, growth of chicks increased significantly when the diet contained only 5% fat; when the diet contained 20% fat, a significant depression in growth resulted. When folacin was omitted from the diet for rats, Co addition failed to produce a growth response; when folacin was added, an average of 18% increase in gain and an increase in the vitamin B_{12} content of the liver resulted from addition of 12 mg of Co/kg of vitamin B_{12}—deficient diet containing 0.1% choline chloride. Co did not improve growth when added to diets that contained adequate amounts of choline, methionine, or vitamin B_{12}. Results indicate that dietary Co is nutritionally important for nonruminants fed diets inadequate in choline and vitamin B_{12}.—*Authors.* (Biological Abstracts)

BURTON, H. W.
SORGHUM DOESN'T HARM CHICKENS. *Queensland Agric. Jour. 80(4):* 221-224. 1955. (Biological Abstracts)

CAMP, A. A. (Texas Agric. Expt. Sta., Gonzales), **B. L. REID,** and **J. R. COUCH.** (Texas A. and M. Coll., College Station.)
GROWTH PROMOTING ACTIVITY OF ASH WHEN FED IN PRACTICAL DIETS TO CHICKS. *Poultry Sci. 35(3):* 621-627. 1956. —Addition of the ash of either fish solubles, dried whey or distillers dried solubles when added to an all-vegetable protein diet produced growth responses of 166, 243 and 140 g, respectively, at 10 weeks in chicks maintained on litter. These differences in growth were significant at the 0.01 level of probability. In the same study the feeding of 3% fish solubles, 3% dried whey or 3% distillers dried solubles produced growth differentials of 230, 242 and 143 g, respectively. The ash growth response was equivalent to about one-half of the growth promoting activity of the untreated product in the case of fish solubles, while the responses with dried whey ash or distillers dried solubles ash were equivalent to the untreated supplements. Addition of fish solubles and dried whey to the diet produced a significantly greater growth response than either fed singly. In a 2nd study the addition of a mineral mixture (reconstituted ash), which stimulated the minerals supplied by a 1:1 mixture of dried whey and fish solubles ash, to the basal diet produced a highly significant increase in the growth rate of the chicks to 10 weeks. Combination of the mineral mixture with 3% fish solubles and 3% dried whey failed to produce a significant growth response over the fish solubles and dried whey combination fed in the absence of the reconstituted ash.—*B. L. Reid.* (Biological Abstracts)

CASTLE, M. E., and **J. O. L. KING.**
FODDER-BEET FOR FATTENING DUCKS. *Empire Jour. Exptl. Agric. 23(91/92):* 251-256. 1955.—Experiments showed that fodder-beet is palatable to ducks and can replace meal to a certain extent and still give good live-weights though not so good as pure meal. The economics and the exact proportions of the fodder-beet to use with meal still need investigating but the method promises well, especially in times of war. —*C. E. Foister.* (Biological Abstracts)

COMMON, R. H., K. A. McCULLY, H. A. STEPPLER, and **W. A. MAW.** (MacDonald Coll., Quebec, Canada.)
OBSERVATIONS ON THE MINERAL METABOLISM OF PULLETS. XI. THE EFFECTS OF PROTRACTED TREATMENT WITH ESTROGEN AND WITH ESTROGEN PLUS ANDROGEN ON RETENTION OF CALCIUM BY THE SEXUALLY IMMATURE PULLET. *Canadian Jour. Agric. Sci. 36(3):* 166-173. 1956.—Sexually immature pullets were treated with 0.5 mg estradiol benzoate (ODB) per day or with 0.5 mg ODB plus 0.4 mg testosterone propionate (TST) and their daily retention of Ca was compared with that of untreated pullets over a period of 28 days. For the untreated birds the daily Ca retention remained relatively constant throughout, though with a slight tendency to decline over the last 18 days. ODB + TST increased the daily retention rapidly to maxima around days 7-9, followed by a slow decline toward the values for the untreated birds. ODB alone failed to elicit a transient increase of Ca retention over the first 3 or 4 days, but Ca retention had declined by about day 10 to minimal values below the level for the controls. Ca retention by the pullets treated with ODB subsequently increased again steadily to attain values at 28 days indistinguishable from those of the controls.—*R. H. Common.* (Biological Abstracts)

CREECH, B. G., B. L. REID, and **J. R. COUCH.** (Texas A. and M. Coll., College Station.)
EVALUATION OF A DICALCIUM PROSPHATE SUPPLEMENT AS A SOURCE OF PHOSPHORUS FOR CHICKS. 1. COMPARISON OF DICALCIUM AND TRICALCIUM PHOSPHATES AS A SOURCE

OF PHOSPHOROUS IN CHICKS AND POULT RATIONS. *Poultry Sci. 35(3):* 654-658. 1956.—Using bone ash as a criterion of measurement, dicalcium phosphate was found to be a superior source of P for chicks and turkey poults. Results indicated the total P requirement of chicks to be 0.55% and for turkey poults, 0.8% when dicalcium phosphate is the supplement. These values were found to be composed of 0.25% inorganic phosphate for chicks and 0.5% for turkey poults.—*B. G. Creech.* (Biological Abstracts)

DeBUSK, BETTY G., and **ROGER J. WILLIAMS.** (U. Texas, Austin.)
EFFECT OF LIPOIC ACID ON THE GROWTH RATE OF YOUNG CHICKS AND RATS. *Arch. Biochem. and Biophys. 55(2):* 587-588. 1955.—Appreciable increases in the growth rate and food utilization of young chicks and rats were obtained when minute amounts of DL-lipoic acid were incorporated in the diet.—*Authors.* (Biological Abstracts)

EDWARDS, H. M. Jr., L. C. NORRIS, and **G. F. HEUSER.** (Cornell U., Ithaca, N. Y.)
STUDIES ON THE LYSINE REQUIREMENT OF CHICKS. *Poultry Sci. 35(2):* 385-390. 1956—Evidence was obtained that the lysine requirement of chicks is related to rate of growth. With slow growth the requirement appeared to be 0.9% of the diet, in agreement with results of earlier work. With more rapid growth the requirement was approximately 1.1% of the diet. The increased lysine requirement was revealed by using day-old chicks and growth periods of 4-6 weeks in place of normally fed, 2-week-old chicks and experimental periods of 8-10 days. The higher value did not appear to be due to the slightly greater lysine content of sesame meal protein found in this investigation, or to the procedures used for determining lysine content.—*L. C. Norris.* (Biological Abstracts)

FERGUSON, T. M., H. P. VAUGHT, B. L. REID, and **J. R. COUCH.** (Texas A. and M. Coll., College Station.)
THE EFFECT OF VITAMIN E, DEHYDRATED ALFALFA MEAL AND CONDENSED FISH SOLUBLES UPON HATCHABILITY OF EGGS FROM BROAD BREASTED BRONZE HENS MAINTAINED ON LITTER. *Poultry Sci. 35(4):* 872-875. 1956.—The reproductive performance of Broad Breasted Bronze turkey hens fed a diet supplemented with vitamin E, dehydrated alfalfa meal and condensed fish solubles was studied. During the first 8 weeks of the test, hatchability of eggs varied from 71 to 79%, and in each instance where vitamin E was added, hatchability was from 2 to 8% over that seen in groups not provided supplemental vitamin E. The hatchability of eggs in the last 12 weeks of the test was improved from 4 to 12% by the addition of vitamin E, dehydrated alfalfa meal or condensed fish solubles fed singly or in combinations of any 2 of these supplements. However, when all 3 supplements were present 77% hatchability was maintained which represented an increase of 21% over that of the basal group which contained none of the supplements.—*T. M. Ferguson.* (Biological Abstracts)

FISHER, HANS, and **HAROLD S. WEISS.** (Rutgers U., New Brunswick, N. J.)
FEED CONSUMPTION IN RELATION TO DIETARY BULK AND ENERGY LEVEL: THE EFFECT OF SURGICAL REMOVAL OF THE CROP. *Poultry Sci. 35(2):* 418-423. 1956.—A series of experiments were carried out with normal and cropectomized birds to study the effect of fiber per se on feed consumption. The following observations were made. Fiber per se stimulates feed consumption. Efficiency of feed utilization is not necessarily sacrificed when fiber is added (simultaneously with fat) to high energy diets, but may actually be improved. Surgical crop removal is harmless operation in chicks with no ill effects on subsequent growth and feed consumption. It is concluded that the crop does not play a major role in controlling feed consumption, at least on all mash diets.—*Auth. summ.* (Biological Abstracts)

FRITZ, J. C., F. D. WHARTON, Jr., R. M. HENLEY, and **R. B. SCHOENE.** (Dawe's Lab., Chicago.)

UNIDENTIFIED GROWTH FACTORS PRODUCED BY STREPTOMYCES SPECIES B-1354. *Poultry Sci. 35(3):* 552-557. 1956.— Fermentation material produced by growing Streptomyces species B-1354 on suitable media possessed marked growth stimulating properties for chicks and for turkey poults. Greatest effect on growth was obtained during the first few weeks, but the advantage was maintained to broiler market weights. Data indicate that the growth stimulation is due to an unidentified factor or factors rather than to the vitamin B_{12} and antibiotic activity which the organism also produces. Maximum growth stimulation was obtained when 0.35% to 1.50% of the dried fermentation product was added to rations made with usual feed ingredients. Evidence is presented to show that the condensed material may be more effective than an equivalent quantity of the dried fermentation product. —*J. C. Fritz.* (Biological Abstracts)

GALVEZ MORALES, D. N. Necesidades de cistina en la alimentacion aviar.

REQUIREMENT FOR CYSTINE IN POULTRY FEED. *An Inst. Invest. Vet., Madrid, 1955-1956. 7,* 3-12. [Secc. Quim. Aliment. Animal.] English and German summaries.

Intake and excretion of cystine by cocks and hens given canary seed were estimated. For cocks the absorption of cystine was 56.3 per cent., and the daily requirement was estimated as 1.0 g. For hens not laying, laying up to 4 eggs in 15 days and laying from 5 to 9 eggs in 15 days, respectively, the values for absorption and daily requirement were: 65.6, 0.9; 53-0, 1.49; 64.6, 2.0. The possibility that these values may not hold for other feeds is recognised. (Nutrition Abstracts and Reviews)

HARMS, R. H., A. A. CAMP, B. L. REID, E. L. GRANT, B. G. CREECH, and **J. R. COUCH.** (Texas A. and M. Coll., College Station.)

EVIDENCE FOR A SUBSTANCE IN FISH SOLUBLES WHICH ENHANCES VITAMIN A STORAGE IN CHICK LIVERS. *Poultry Sci. 35(2):* 285-291. 1956.—Condensed fish solubles, added to a basal diet containing either a fish oil concentrate or a dry-stabilized vitamin A concentrate as a source of the vitamin, increased the storage of vitamin A in the livers of chicks 3, 4, 9 or 10 weeks of age. The factor responsible for the increased vitamin A content of the livers was stable to boiling with aeration for 8 hours. It was present in the water soluble portion of fish solubles; while the chemical vitamin A activity occurred in the water insoluble residue upon filtration. When fed as the sole source of vitamin A in the basal diet, the fish solubles residue produced vitamin A storage values considerably below those obtained with the same level of vitamin A supplied as fish oil. The vitamin A in fish soluble is either largely unavailable or interfering materials caused the chemical evaluation of the vitamin A content to be inaccurate.— *B. L. Reid.* (Biological Abstracts)

JAFFE, W. P. and **J. A. WAKELAM.**

UNIDENTIFIED CHICK GROWTH FACTORS IN FERMENTATION BY-PRODUCTS. *Nature, 1956, 178,* 414. [Univ. Bristol, Langford House.]—The control group 1, of 25 day-old White Leghorn × Rhode Island Red male chicks, was given a purified ration of casein, gelatine, maize starch, sucrose and lard, with distiller's dried grains to supply roughage, supplemented adequately with minerals, vitamins and amino acids. Experimental groups 2 and 3 were given, in addition, 7½ per cent of a 40:60 mixture of distiller's dried grains and distiller's dried solubles or 3 per cent dried solubles treated to counteract hygroscopic tendencies. Total weight gain in 27 days was, for groups 1, 2 and 3, respectively, 280.3, 303.9 and 306.9 g. and feed per g. liveweight increase was 1.88, 1.84 and 1.82 g. The response to solubles in groups 2 and 3 was highly significant. (Nutrition Abstracts and Reviews)

JENSEN, L. S., M. L. SCOTT, G. F. HEUSER, L. C. NORRIS, and **T. S. NELSON.** (Cornell U., Ithaca, N. Y.)

STUDIES ON THE NUTRITION OF BREEDING TURKEYS. 1. EVIDENCE INDICATING A NEED TO SUPPLEMENT PRACTICAL TURKEY RATIONS WITH VITAMIN E. *Poultry Sci. 35(4):* 810-816. 1956.—Results are presented which show that for maintenance of high hatchability practical turkey breeding rations often require supplementation with vitamin E. Results indicate, also, that an unknown factor present in fresh forage juice is required for hatchability. Experiments have been conducted on the quantitative vitamin E requirement of breeding turkey hens. Results indicate that the vitamin E requirement of breeding turkeys is in excess of 13.6 I. U. of vitamin E/lb. of diet, since this was the approximate amount needed in addition to that present in the basal diet.—*M. L. Scott.* (Biological Abstracts)

JUKES, H. G., D. C. HILL, and **H. D. BRANION.** (Ontario Agric. Coll., Guelph, Canada.)

EFFECT OF FEEDING ANTIBIOTIC ON THE INTESTINAL TRACT OF THE CHICK. *Poultry Sci. 35(3):* 716-723. Illus. 1956.—The average weight of the intestinal tract was less for chicks fed antibiotics than for controls. Some of the differences were statistically significant. The reduced weight did not appear to be due to a shortening of the tract or to a reduction in its content of fat or moisture. This is in agreement with the findings of other workers. Microscopic examination of serial sections of the duodenum of antibiotic-fed birds and of controls revealed that sections from the former had, on the average, a smaller diameter, a thinner tunica propria layer and shorter villi. Observed differences in diameter and thickness of the tunica propriae were statistically significant ($P<0.01$). Measurement of the combined muscularis, muscularis mucosae, tunica propria and villus was less for the sections from birds receiving antibiotic and this difference approached significance at the 5% probability level. At time of slaughter, observations were made on the appearance of the mesenteric blood vessels of the duodenum. Contrary to a report of other workers their degree of dilation or prominence was not found to be influenced by the presence of antibiotic in the diet.—*D. C. Hill* (Biological Abstracts)

KEAN, R. I. (N. Zealand Forest Serv., Wellington.)

NOTORNIS FAECES IN EVIDENCE ON FOODS AS A FACTOR IN CHICK REARING SUCCESS. *Notornis 6(8):* 229-231; 237-240. 1956.—The gallinule, *Notornis hochstetteri,* which prior to 1948 was believed to be extinct, survives in a region which is poorly supplied with foods rated as palatable for other browsing wildlife animals. Recorded breeding success has been low, and botanical evidence suggested that degree of failure—in chick rearing, in hatching, or in laying—could well be correlated with the observed variation in scarcity of preferred plants. A preliminary test of this theory was made by the analysis of 323 droppings taken from two territories—from the most successful and from the best unproductive one. Results of this pilot study must be viewed with reserve, but the difference in the utilization of preferred plants during the probable early nesting period was 59.9% : 5.1%—supporting the hypothesis. In the post-nesting period, when foods would have been available in excess of requirements, the ratio was more equal—85.5% : 65.7%.—*R. I. Kean.* (Biological Abstracts)

KRATZER, F. H., P. N. DAVIS, and **URSULA K. ABBOTT.** (U. California, Davis.)

THE FOLIC ACID REQUIREMENTS OF TURKEY BREEDER HENS. *Poultry Sci. 35(3):* 711-716. 1956.—Hatchability of turkey eggs was reduced when hens were fed rations deficient in folic acid. Approximately 0.7 mg of folic acid/kg of ration was required to produce optimum hatchability. Egg production was not reduced by the low folic acid rations, and no gross abnormalities were noted in the hens. Embryo mortality from hens fed rations deficient in folic acid was greatly increased. The largest proportion of these embryos died in the period immediately before hatching time (26-28 days). While a large proportion

of them appeared normal grossly, an increased incidence of abnormalities of the extremities (micromelia, twisted hocks, defects of the mandible, crossed beak, etc.) and of the circulatory system (hemorrhages, edema, and enlarged, fluid filled gizzard) were seen.—*F. H. Kratzer.* Biological Abstracts)

KRZANOWSKA, H. (Instytutu Zootechniki w Pulawach, Poland.)
THE INFLUENCE OF VITAMIN B_{12} ON SPERM QUALITY IN THE FOWL. *Roczniki Nauk Rolniczych 70:* 317-332, 1956.—Vitamin B_{12} is required to maintain cocks fed on an all vegetable protein ration in a good condition. Under conditions of the above experiments this vitamin had no direct effect on sperm production rate of the methylene blue and the capacity of fertilization improved somewhat in the experimental cocks as compared with the control group. (Author)

KURNICK, A. A., R. L. SVACHA, B. L. REID, and **J. R. COUCH.** (Texas A. and M. Coll., College Station.)
FURTHER EVIDENCE FOR AN UNIDENTIFIED FACTOR REQUIRED IN A PURIFIED DIET FOR NORMAL HATCHABILITY. *Poultry Sci. 35(3):* 658-662. 1956.—An unidentified factor(s) required by the hen, fed a purified type diet, for normal hatchability was present in liver preparations, condensed fish solubles, and fermentation products. Hens fed a purified diet for a depletion period (10-16 weeks) produced eggs which exhibited a hatchability of 30 to 40% and a high incidence of embryonic mortality during the first week of incubation. Addition of liver fraction "L" (4%), Biopar "C" (4%), condensed fish solubles (4%) or fermentation residues resulted in a marked increase of hatchability of fertile eggs during the subsequent 6 week period.—*A. A. Kurnick.* (Biological Abstracts)

LATORRE, GLAUSER, LUIS.
DETERMINACION MICROBIOLOGICA DE LA VITAMINA B_{12} IN HARINAS PESCADOS NACIONALES Y DE LOS ESTADOS UNIDOS DE NORTE AMERICA Y EN OTROS ALIMENTOS DE LOS AVES. *Arch Zootecnia 5(17):* 37. 1956.—Using the variation of Coates on Ott's method with chickens the author analyzed various feed stuffs and got a growth curve. From this he determined the contents of vitamin B_{12} in the different samples. Great variation was noticed.—*D. F. Watson.* (Biological Abstracts)

MACHADO, A. V., J. A. CARNEIRO VIANA, and **N. M. RANGEL.** (Universidade Rural, Belo Horizonite, Brazil.)
NUTRITIONAL ENCEPHALOMALACIA OF CHICKS. (Encefalomalacia nutricional espontanea em pintos.) *Arq. Esc. Sup. Vet. (Brazil) U. R. E. M. G. Vol. VIII, 1954:* 37-45.—The authors report, for the first time in Brazil, the occurrence of nutritional encephalomalacia of chicks. Clinical and pathological findings are described and its diagnosis discussed. Administration of vitamin E has given curative and prophylatic results. (Authors)

MARCH, B., and **JACOB BIELY.** (U. British Columbia, Vancouver, Canada.)
FAT STUDIES IN POULTRY. 5. THE EFFECT OF DIETARY FAT LEVEL ON THE CHOLINE REQUIREMENT OF THE CHICK. *Poultry Sci. 35(3):* 545-549. 1956.—Effect of dietary fat level on the requirement of the chick for supplementary choline in a natural diet supplemented with vitamin B_{12} was studied. It is concluded that a diet containing 600 mg of choline/lb. from natural ingredients supplies sufficient choline for growth if the diet is adequate in methionine. The choline requirement of the chick is increased when high levels of fat are added to a diet low in methionine. This increase in choline requirement, however, appears to be secondary to an increased need for methionine.—*J. Biely.* (Biological Abstracts)

MARQUEZ, L. S. and **P. B. AGCANAS.**
A STUDY ON THE INFLUENCE OF FOUR CHICK STARTER

RATIONS ON THE RATE OF GROWTH AND MORTALITY OF CHICKS. *Philippine J. Animal Indust., 1955, 16,* 35-47.—Group 1 was given a ration based on rice bran, maizemeal, soya bean oilmeal and fishmeal, and also received chopped young green grass to appetite. Group 2 got the same starter ration but had ipil-ipil *(Leucaena glauca)* leaf meal instead of chopped grass. Group 3 had a mash containing copra meal, whey, ipil-ipil meal and aureomycin in addition to the ingredients of that of groups 1 and 2. Group 4 got a commercial starter mash. All the mashes supplied about 20 per cent protein. For each group duplicate sets of White Leghorn and New Hampshire chicks were used, 90 chicks in each, and the trial continued from day-old to 8 weeks.

In both breeds the order of rate of gain was group 4, 3, 2 and 1, with weights at 8 weeks for White Leghorns and New Hampshires, respectively, of 549.1, 589.3; 447.3, 526.0; 356.3, 420.3 and 354.2, 401.9 g. Efficiency of feed utilisation was highest in group 4 of White Leghorns and group 3 of New Hampshires. Mortality in both breeds was highest in group 2 and lowest in group 4. Carcase quality and uniformity of growth in the groups were in the same order as growth rate. (Nutrition Abstracts and Reviews)

MEHRING, ARNON L. Jr., JOHN H. BRUMBAUGH, and **HARRY W. TITUS.** (Lime Crest Res. Lab., Newton, N. J.)

A COMPARISON OF THE GROWTH OF CHICKS FED DIETS CONTAINING DIFFERENT QUANTITIES OF ZINC. *Poultry Sci. 35(4):* 956-958. 1956.—Graduated levels of Zn were added in the form of ZnO to a corn-soybean diet that was fed to New Hampshire chicks in batteries. The total quantity of Zn in the diets (including that available in the drinking water) ranged from about 42 to 820 ppm. The experiment was terminated when the chicks reached 9 weeks of age. There was no effect from the addition of any of the levels of Zn on either gain in live weight or efficiency of feed utilization.—*A. L. Mehring, Jr.* (Biological Abstracts)

MILBY, T. T. (Larro Res. Farm, General Mills Inc., Indianola, Iowa), and **D. H. SHERWOOD.**

THE INFLUENCE OF FEED INTAKE DURING THE GROWING PERIOD ON THE SUBSEQUENT PERFORMANCE OF LAYING HENS. *Poultry Sci. 35(4):* 863-869. 1956.—Restricting the feed intake of S.C.W. Leghorn and W. P. Rock pullets between the 6th week and the beginning of egg production to 85% of feed consumed by full fed birds in confinement and 70% of that of pullets on range significantly reduced growth rate and delayed sexual maturity 10-15 days. There was no saving in feed cost to the time of first production, because of the longer feeding period for restricted pullets. Restriction had no real effect on subsequent egg production, body weight after 6 weeks of production, fertility, hatchability or laying house mortality.—Auth. summ. (Biological Abstracts)

MORRISON, A. B., and **L. C. NORRIS.** (Cornell U., Ithaca, N. Y.)

FAILURE OF THIOCTIC ACID TO STIMULATE CHICK GROWTH. *Poultry Sci. 35(3):* 739-740. 1956.—Experiments were conducted to determine if dl-thioctic acid (lipoic acid) is required for chick growth. Insofar as possible the procedures of DeBusk and Williams (Arch. Biochem. Biophys. 55:587-588, 1955) were followed in the investigation. Under the experimental conditions dl-thioctic acid had no significant effect on chick growth. Results of the experiment were in agreement with those of Stokstad, Broquist and Patterson (Fed. Proc. 12:430, 1953), and in disagreement with those of DeBusk and Williams.—*L. C. Norris.* (Biological Abstracts)

MOTZOK, I., D. ARTHUR, and **H. D. BRANION.** (Ontario Agric. Coll., Guelph, Canada.)

UTILIZATION OF PHOSPHORUS FROM VARIOUS PHOSPHATE SUPPLEMENTS BY CHICKS. *Poultry Sci. 35(3):* 627-649. 1956.—Phosphate supplements (27), both chemical and commercial grades, were tested as to availability for growth and bone ash in a series of experiments with chicks of heavy breeds to 5 weeks of age, using a

broiler-type basal diet, having a total P content of 0.49% and an inorganic P content of 0.17%. Most of the comparisons were made with enough of each supplement to provide a total inorganic P level of 0.4%, using tricalcium phosphate (chemical grade) as a standard. Bone meal and monocalcium phosphate were used as a standard in some trials. The Ca:P ratio was adjusted to 2:1 with calcium carbonate. The P of steamed and feeding bone meals, (domestic and imported) tricalcium phosphate (chemical grade), mono-, di-, and mono-dicalcium phosphates, mono-and disodium phosphate, sodium tripolyphosphate, tetrasodium pyrophosphate, acid sodium pyrophosphate (all commercial grades) and Curacao Island phosphate were readily available. Some of the colloidal phosphates gave significantly lower growth response and percent bone ash than tricalcium phosphate. One sample of colloidal phosphate gave a growth response and percent bone ash not significantly lower. One sample of defluorinated phosphate resulted in significantly inferior growth than tricalcium phosphate but the percent ash was not different. Two samples of rock phosphate (fertilizer grade) containing 2.9 and 3.8% fluorine and contributing 0.059 and 0.058% fluorine, respectively, to the ration at the levels used, were tested. The first one gave satisfactory growth and bone ash responses while the second gave significantly inferior growth and calcifications. The colloidal phosphates contributed from 0.033 to 0.045% fluorine to the rations and the poor results from these supplements do not seem to be due to their fluorine content. When half of the added P supplied by colloidal phosphate was replaced by bone meal there was an improvement in growth over the natural phosphate alone, but it was still significantly below the growth given by the bone meal or tricalcium phosphate. However, the percent bone ash was as good as that of the positive controls. Addition of bentonite, charcoal or celite in amounts equal to the inert material in colloidal phosphates, to diet supplemented with monocalcium phosphate did not decrease growth or percent bone ash. Adding Fe and aluminum oxides, in amounts present in the colloidal phosphates, also had no deleterious effect. Increasing the level of vitamin D_3 in the ration did not improve the availability of phosphorous in colloidal phosphate. Since viability was normal with all groups it was concluded that none of the supplements contained toxic compounds at the levels fed. The differences obtained in some experiments between the growth response and percent bone ash suggest that either the requirement of P for growth is different from that for bone calcification or that the metabolism of P in these functions is different.—*Authors.* (Biological Abstracts)

NABER, EDWARD C., and **CHARLES L. MORGAN.** (South Carolina Agric. Exptl. Sta., Clemson.)

FEATHER MEAL AND POULTRY MEAT SCRAP IN CHICK STARTING RATIONS. *Poultry Sci. 35(4):* 888-895. 1956.—Interest has grown in the use of feathers and poultry offal as feedstuffs. Chicks were reared in batteries or floor pens and fed experimental diets. Basal ration 1 was a corn-soybean oil meal ration fortified with fish meal, dried whey product, D L-methionine, minerals, vitamins and antibiotics. Basal ration 2 (vitamin B_{12} deficient) was composed of corn, soybean oil meal, D L-methionine, minerals and crystalline vitamins. Substitutions were made at expense of soybean oil meal. When feather meal, poultry meat scrap, fish meal and combinations were fed to supply 5.0% protein in basal ration 1, growth and feed efficiency of broilers to 9 weeks was comparable or slightly better than that on the basal. In 2 other trials, feather meal gave a growth response comparable to that obtained from the fish meal and dried whey product when these were omitted from basal ration 1. Five trials in floor pens have given substantially the same results. Three other battery trials have indicated that both feather meal and/or crystalline vitamin B_{12} stimulated growth equally when added to basal ration 2, thus suggesting feather meal as a vitamin B_{12} source. Market quality feather meal fed broilers was excellent and distinguishable from that of controls.—*Auth. summ.* (Biological Abstracts)

OPICHAL, M. Pusobení prokain penicilinu, ZBF a stilbestrolu na rust kurat, krmenych dávkou deficitní na zivočisnou bílkovinu.

EFFECT OF PROCAINE PENICILLIN, ANIMAL-PROTEIN FACTOR AND STILBOESTROL ON THE GROWTH OF CHICKENS ON A RATION DEFICIENT IN ANIMAL PROTEIN. *Véd. Práce,* 1955, 143-166. [Res. Inst. Animal Nutrit. CSAZV, Brno.]—Eight groups of 14 White Leghorn chickens were kept in new disinfected cages on wire screen floors. Group 1, control, received a ration deficient in animal protein and to this ration were added the following supplements: group 2, animal-protein factor (APF); group 3, procaine penicillin; group 4, APF and procaine penicillin; group 5, APF from the beginning of the experiment and procaine penicillin from the seventh week of age; group 6, procaine penicillin from the seventh week of age; group 7, APF and procaine penicillin from the beginning of the experiment and at the age of 7 weeks a pellet of diethylstilboestrol propionate implanted subcutaneously. Group 8 was given a normal ration containing animal protein as fishmeal. APF (Merck and Co., Inc.) was given as 0.6 per cent and procaine penicillin as 10 mg. per kg. feed.

It was concluded that APF or procaine penicillin or both did not stimulate growth significantly up to 6 weeks. From 7 to 14 weeks of age both APF and penicillin increased growth rate by from 9.4 to 36.5 per cent, and in the amounts given were similar in effect. Stilboestrol increased the growth rate of cockerels but not of pullets.—*M. Proksová* (Czechoslovakia). (Nutrition Abstracts and Reviews)

PATTERSON, E. B., J. R. HUNT, P. VOHRA, L. G. BLAYLOCK, and **J. McGINNIS.** (State Coll. Washington, Pullman.)

THE NIACIN AND TRYPTOPHAN REQUIREMENTS OF CHICKS. *Poultry Sci. 35(3):* 499-504. 1956.—A study was conducted in an effort to determine the quantitative niacin and tryptophan requirements of young chicks for optimal growth and the inter-relationships existing between these 2 nutrients. Under the conditions of these studies, the results indicate that: (1) The niacin requirement for optimal growth of chicks fed acorn-soybean protein gelatin diet was not greater than 8 to 9 mg/lb. of feed in the presence of 0.10% supplementary DL-tryptophan. The basal diet contained 0.14% tryptophan. (2) Approximately 13-15 mg niacin/lb. of diet were required for optimal growth of chicks fed the basal diets which contained an average of 0.14% tryptophan. (3) The tryptophan requirement was not more than 0.14% in the presence of an adequate level (13.0-15.0 mg/lb.) of niacin and not more than 0.24% (basal diet and 0.1% DL-tryptophan) in the presence of a minimal amount of niacin (8.0-9.0 mg/lb.). (4) Tryptophan completely compensated for a partial niacin deficiency. (5) The incidence of perosis was negligible when the diets contained 10-11 mg of niacin/lb. and 0.24% tryptophan. *Authors.* (Biological Abstracts)

RAICA, NICHOLAS, BURT W. HEYWANG, and **A. R. KEMMERER.** (U. Arizona, Tucson.)

ANTIBIOTIC CONCENTRATION IN EGGS FROM HENS ON CHLORTETRACYCLINE SUPPLEMENTED DIETS.—*Poultry Sci. 35(4):* 884-888. 1956.—White Leghorn layers, approximately 1 year old, were fed chlortetracycline supplemented diets at levels of 50, 100, 200, 500, 1000, and 2000 g/ton. The eggs (747 from 91 hens) were assayed for their chlortetracycline content by the Grady and Williams pad-plate technique employing *Bacillus cereus* no. 5 as the test organism. No antibiotic was detected from the 50-200 g/ton levels. Amounts varying from 0.018-0.141 μg/g of egg were found in the 500-2000 g/ton levels. The highest percentage of positive eggs was found during the second week of supplementation. All eggs became negative during the first week after removal of antibiotic from the diet. Although the data show a large individual hen and group variation, there is some indication that the antibiotic is deposited in proportion to the daily yolk increments during the time on antibiotic.—*Auth. summ.* (Biological Abstracts)

REISER, RAYMOND, JULIUS W. DIECKERT, and JAMES G. HAMILTON. (Agric. Expt. Sta., College Station, Texas.)
METHYL ESTERS OF TALLOW FATTY ACIDS IN A POULTRY RATION. *Jour. Agric. and Food Chem. 4(9):* 798-799. 1956.—Methyl esters (3-15%) in chicken ration do not affect rate or efficiency of gain. During 5 weeks esters or tallow increased feed efficiency in proportion to increased caloric value. On high fat rations added methionine increased growth rate and feed efficiency of females but not males. Methyl esters are easily incorporated into dry rations.—*S. L. Hood.* (Biological Abstracts)

ROSENBERG, M. M. (U. Hawaii, Honolulu.)
EVALUATION OF CUBAN HIGH TEST SYRUP IN CHICK RATIONS. *Poultry Sci. 35(3):* 558-562. 1956.—Cuban High Test syrup was fed at graded concentrations ranging from 0 to 34.5% of total ration to duplicate lots of day-old chicks in 2 contiguous trials that lasted 6 weeks. Growth rates were essentially as good as the controls at all levels fed. At 34.5% of total ration, the syrup-fed cockerels averaged 97.4% while the pullets were 101.4% as heavy as their respective controls. Efficiency of feed conversion was as good as the controls on levels of High Test syrup up to 16.5%. On higher levels, there was a tendency toward decreasing efficiency with each additional increment of syrup. However, only the ration containing 34.5% syrup was significantly less efficient than the control. None of the levels of syrup fed in this study adversely affected chick livability to 6 weeks of age. When compared at 23.0, 28.5, and 34.5% of total ration, Cuban High Test syrup was superior to Hawaiian cane final molasses at each level fed in its effects on growth rate and efficiency of feed utilization. All the syrup- and molasses-style rations induced significantly higher fecal moisture values than the molasses control; but, in each comparison, the syrup rations induced lower moisture values. None of the High Test syrup rations were objectionable with regard to this characteristic under the conditions of this investigation.—*M. M. Rosenberg.* (Biological Abstracts)

ROSENBERG, M. M., and A. L. PALAFOX. (U. Hawaii, Honolulu.)
EFFECT OF CERTAIN CATIONS IN CANE FINAL MOLASSES ON FECAL MOISTURE OF CHICKS. *Poultry Sci. 35(3):* 682-686. 1956.—Straight-run, day-old New Hampshire chicks, during a 14-day-interval were fed experimental rations, in 2 trials, containing either granulated sugar, cane molasses ash, a synthetic mineral mixture that stimulated this ash, potassium chloride, magnesium oxide, or water in amounts equivalent to their respective concentrations in cane final molasses fed at 33.0% of total ration. Wherever K appeared in this study, the fecal moisture levels were raised significantly, ranging from 85.87 to 86.88%. In contrast, granulated sugar, magnesium oxide, and water did not significantly increase fecal moisture values. None of the experimental diets adversely affected growth rate and livability in the 2 trials. However, efficiency of feed conversion was significantly depressed wherever potassium chloride and/or water were added to the experimental diets. Neither granulated sugar nor magnesium oxide, at the levels fed, depressed efficiency of feed conversion. Apparently the K salts in cane final molasses, when included in chicken rations at a sufficiently high concentration, are the primary cause of diarrhea, the laxation resulting in a reduced efficiency of feed utilization due to the frequent voiding of the intestinal ailment. The water in cane final molasses also impairs efficiency by reducing the caloric value of the ration.—*M. M. Rosenberg.* (Biological Abstracts)

SALANDER, R. C., and HANS FISHER. (Rutgers U., New Brunswick, New Jersey.)
PLASMA AMINO NITROGEN AND CREATINE VALUES OF GROWING CHICK AND LAYING HEN. *Proc. Soc. Exptl. Biol. and Med. 92(3)* 538-540. 1956.—Using Lloyd's reagent, average plasma creatine values by the Jaffe reaction for 5-weeks old cockerels and laying hens are .97 ± .09 and 1.17 ± .13 mg/100 ml plasma, respectively. The respective amino N values are 8.37 ± .40 and 7.97 ± .09 mg/100 ml

plasma. There is no significant difference between the values of the cockerels and laying hens. For conversion to whole blood values the chick and hen hematocrit of 28 - 30 (cr. mammalian hematocrit of 50) must be used.—*Authors.* (Biological Abstracts)

SCHOETTLE, C. E. (U. Illinois, Urbana.), **E. F. REBER, H. W. NORTON,** and **J. O. ALBERTS.**

A STUDY OF NEW HAMPSHIRE X BARRED COLUMBIAN CHICKS FROM TWO DAYS TO TEN WEEKS OF AGE. 2. EFFECT OF COCCIDIOSTATS AT TEN WEEKS OF AGE. *Poultry Sci. 35(3):* 596-599. 1956.—New Hampshire X Barred Columbian cockerels were fed a ration containing 0.0175% sulfaquinoxaline, 0.02% 3,3′dinitrodiphenyldisulfide, 0.0075% 3-nitro-4-hydroxyphenylarsonic acid singly or in combinations (factorial design) from 2 days to 10 weeks of age. By 10 weeks of age, 3-nitro-4-hydroxyphenylarsonic acid and significantly increased body weight and per cent fat in the liver. Tibia weights were increased about equally by 3-nitro-4-hydroxyphenylarsonic acid and by sulfaquinoxaline. The addition of 3,3′-dinitrodiphenyldisulfide significantly depressed body weight. These chicks had small spleens, livers, tibias and femurs. Their livers and femurs had a significantly decreased per cent of fat.—*E. F. Reber.* (Biological Abstracts)

SCOTT, H. M., B. CONNOR JOHNSON, and **M. W. MOELLER.** (U. Illinois, Urbana.)

THE RESPONSE OF CHICKS TO FISH MEAL IN RELATION TO THE COMPOSITION OF THE BASAL DIET. *Poultry Sci. 35(4):* 924-925. 1956.—The growth of male chicks on a purified diet was essentially the same when sucrose was used as the carbohydrate as when dextrose (cerelose) was employed. Ten per cent fish meal significantly improved chick growth to the same degree for both carbohydrate sources. Iodinated casein (0.03%) failed to accentuate the chick's requirement for the unidentified factor in fish meal. This was true for both sexes.—*H. M. Scott.* (Biological Abstracts)

SIZEMORE, J. R., and **R. J. LILLIE.** (U. S. Dept. Agric., Beltsville, Md.)

LACK OF EFFECT OF A SYNTHETIC POULTRY FEED FLAVOR ON CHICK GROWTH AND FEED EFFICIENCY. *Poultry Sci. 35(2):* 360-361. 1956.—A series of 3 chick feeding trials of a 4 week duration were run to determine the effect of a synthetic poultry feed flavor upon growth and feed efficiency. Three diets were used: an all-vegetable protein diet amply fortified with all known nutrients; the same basal diet suplemented with fish meal; and the same basal diet supplemented with pork fat. The flavor was fed at the rates of 125, 250, and 500 ppm. Results obtained were inconsistent and there was no indication that the particular synthetic poultry feed flavor used in the study had any effect on growth and feed efficiency.—*J. R. Sizemore.* (Biological Abstracts)

SNYDER, J. M., W. D. MORRISON, and **H. M. SCOTT.** (U. Illinois, Urbana.)

THE ARGININE REQUIREMENT OF CHICKS FED PURIFIED AND CORN-SOYA DIETS. *Poultry Sci. 35(4):* 852-855. 1956.—A purified diet containing 18% casein and 10% gelatin proved to be deficient in arginine. Maximum chick growth on a 22% casein diet was not reached until sufficient arginine was added from l-arginine HCl or gelatin to bring the total arginine level to about 1.7% of the diet. A corn-soya diet calculated to contain 1.11% arginine was not improved by gelatin. Neither arginine nor glycine or combinations thereof improved the growth promoting ability of the corn-soya ration.—*H. M. Scott.* (Biological Abstracts)

STOKSTAD, E. L. R., E. L. PATTERSON, A. M. ALBRECHT, and **R. H. WHITE-STEVENS.** (Nutrition Physiol. Section, Amer. Cyanamid Co., Pearl River, N. Y.)

ROLE OF THIOCTIC ACID IN CHICK NUTRITION. *Proc. Soc. Exptl. Biol. and Med. 92(1):* 88-91. 1956.—Thioctic acid (lipoic acid) did not increase the growth of chicks on purified type diets or on

practical rations containing natural feedstuffs. Thioctic acid is synthesized by the developing chick embryo. The thioctic acid content of a hen egg is 0.5 μg while that of the 21 day embryo is 11.5 μg. A methionine deficiency in chicks did not decrease the level of thiotic acid in the liver and heart tissues.—*E. L. R. Stokstad.* (Biological Abstracts)

SUNDE, M. L. (Wisconsin U., Madison.)
THE EFFECT OF FATS AND FATTY ACIDS IN CHICK RATIONS. *Poultry Sci. 35(2):* 362-368. 1956.—Representative types of inedible animal fats were fed to chicks. Choice white grease, brown grease, prime tallow and No. 1 tallow were used in chick starting diets without deleterious effects at the 5% level. All these materials improved feed utilization. Oleic acid, linolenic and linoleic acid did not affect the growth rate and improved feed utilization. The incorporation of 5% hydrogenated fat or stearic acid in the diet did not improve feed utilization. The chicks did not utilize the saturated long chain fatty acids provided by these materials. A comparison of a medium and a high energy formula was made and the addition of fat to either diet resulted in about the same improvement in feed conversion. Fatty acid fractions of crude tall oil preparations were toxic to the chicks probably because of the rosin acids which they contained. Chicks given access to feed with and without added fat ate about twice as much of the feed with the added fat.—*M. L. Sunde.* (Biological Abstracts)

SUNDE, M. L., and **H. R. BIRD.** (U. Wisconsin, Madison.)
A CRITICAL NEED OF PHOSPHORUS FOR THE YOUNG PHEASANT. *Poultry Sci. 35(2):* 424-430. 1956.—Pheasant chicks were fed a diet containing 0.66% P. When this diet was fed, high mortality resulted. The pheasant chicks, after 2 weeks on this diet, showed a distinct bending of the tarsometatarsus near the hock joint and of the proximal end of the tibiotarsus. Bone ash values were reduced from a normal of about 52% to 38% when the basal diet was fed. Additions of 0.3%-0.8% of P from dicalcium phosphate resulted in normal growth, normal bone formation and calcification. The pheasant chicks exhibited a distinct leg weakness on the basal diet at one week of age. Differences in weight were also becoming apparent at that time. The pheasant chick would be a good assay animal for studying P metabolism and availability.—*M. L. Sunde.* (Biological Abstracts)

VOHRA, PRAN, FAYNE H. LANTZ, and **F. H. KRATZER.** (U. California Davis.)
THE EFFECT OF FOLIC ACID AND VITAMIN B_{12} ON THE SYNTHESIS OF SERINE AND CHOLINE FROM GLYCINE IN THE LIVER OF YOUNG TURKEY POULTS. *Jour. Biol. Chem. 221(1):* 501-507. 1956.—Livers from normal, folic acid-deficient, and vitamin B_{12}-deficient turkey poults were incubated with glycine-2-C^{14}. In the normal poult the alpha-carbon of glycine was found in the 2 and 3 positions of serine, and in both the methyl groups and ethanolamine moiety of choline. A folic acid deficiency reduced the total amount of serine synthesized from the alpha-carbon of glycine with a greater reduction in the incorporation of C^{14} in the 3 position than in the 2 carbon. Choline synthesis was reduced slightly with a reduction of incorporation of C^{14} in the ethanolamine moiety and an increase in the methyl groups. A deficiency of vitamin B_{12} did not reduce total serine synthesis but reduced the incorporation of C^{14} into the 3 positions. Choline synthesis was reduced slightly with the reduction in incorporation in the methyl group proportional to that of total choline. The data suggest that vitamin B_{12} functions in the conversion of the alpha-carbon of glycine to a single carbon unit which can be used both for methyl synthesis and for conversion to hydroxymethyl THFA.—*F. H. Kratzer.* (Biological Abstracts)

WEST, JOHN W. (Mississippi Agric. Exptl. Sta., State Coll.)
EFFECTS OF 3-NITRO-4-HYDROXYPHENYLARSONIC ACID AND CERTAIN ANTIBIOTICS IN BROILER RATIONS. *Poultry Sci. 35(4):* 835-842. 1956.—Stimulating effects of 3-nitro-4-hydroxyphenylarsonic acid were seen in a series of 9 broiler feeding trials involving

47 experimental pens and approximately 5400 straight-run New Hampshire chicks. The arsonic compound was added at the rate of 45 g/ton to broiler diets containing zero, "low" and "high" levels of certain antibiotics. Growth and feed efficiency were improved approximately 8%, 5% and 2% when the arsonic acid derivative was added to diets containing zero, "low" and "high" levels of antibiotics, respectively. Livability, uniformity of body weights, and the extent of yellow pigment deposition apparently were unaffected by the presence of the arsonic compound.—*J. W. West.* (Biological Abstracts)

WILLIAMS, M. A., and C. R. GRAU.
ENERGY INTAKE AND BODY COMPOSITION OF THE CHICK IN RELATION TO THE DIETARY CONCENTRATIONS OF DIGESTIBLE CARBOHYDRATE AND DIGESTIBLE FOOD ENERGY. *J. Nutrition,* 1956, *59,* 255-265. [Dept. Poultry Husb., Univ. California, Berkeley.]—Groups 1, 2 and 3, each of ten 14-day-old chickens, were given, respectively, for 21 days, a ration with 15 per cent protein supplied by sesame seed (see Abst. 623, Vol. 27) or the same with 5 or 15 per cent cellu flour (cellulose) to replace glucose. Growth rates were estimated, and at the end fat, protein and water were estimated in the carcases.

Weight gains of all groups were similar, but feed intake was greatest in group 3, least in group 1. Intake of metabolisable energy was similar in groups 1 and 2, and less in group 3. At slaughter the chickens in groups 1 and 2 contained significantly more fat and less water than group 3; there was no difference in N or total empty weight. (Nutrition Abstracts and Reviews)

WYNE, J. W., H. YACOWITZ, V. D. CHAMBERLIN, R. D. CARTER, and M. G. McCARTNEY. (Ohio Agric. Expt. Sta., Wooster.)
A COMPARISON OF GROWING RATIONS FOR TURKEYS REARED IN CONFINEMENT. *Poultry Sci. 35(3):* 735-736. 1956.—Three groups of turkeys were fed a basal ration, a basal ration minus fish meal and a basal ration minus fish meal and dried whey between 12 and 24 weeks of age. The protein level of the ration was maintained at 28%, where fish meal and/or dried whey was omitted, by adjusting the ground corn and soybean oil meal ratio. All groups also received corn and oats free-choice. No significant differences were obtained among groups for weight at 24 weeks of age. Results indicate that fish meal and/or dried whey are not required for growth of confinement reared turkeys, when rations are adequately supplied with all known vitamins. Somewhat poorer feed conversion, however, was obtained when both fish meal and dried whey were omitted from the growing ration.—*M. G. McCartney.* (Biological Abstracts)

PATHOLOGY

BROADFOOT, DONALD I. (Hy-Line Poultry Farms, Owatonna, Minnesota), **B. S. POMEROY, and W. M. SMITH, JR.**
EFFECTS OF INFECTIOUS BRONCHITIS IN BABY CHICKS. *Poultry Sci. 35(4):* 757-762. 1956.—Permanent damage to the reproductive system was induced in female chicks by exposure to infectious bronchitis (IB) virus at the ages of 1, 4, 8, 11, 15 and 18 days. The percent of birds affected decreased with increased age at the time of exposure. Birds so damaged did not differ in appearance from normal, mature laying hens, visiting the nest with normal regularity, but producing no eggs. The abnormalities varied, consisting of cystic, non-patent oviducts, limited development of the glandular areas, constriction of diameter or length. Such abnormalities were similar to those examined in non-layers occurring in clinical cases previously encountered. Another experiment was conducted at the same time, using an attenuated commercial IB vaccine. Almost no abnormalities were found in the birds of this group.—*D. I. Broadfoot.* (Biological Abstracts)

CAMPBELL, J. C.

AN INVESTIGATION OF THE HEPATOTOXIC EFFECTS IN THE FOWL OF RAGWORT (SCENECIO JACOBAEA LINN.), WITH SPECIAL REFERENCE TO THE INDUCTION OF LIVER TUMORS WITH SENECIPHYLLINE. *Proc. Roy. Soc. Edinburgh 66(1)B:* 111-130. Illus. 1956.—The alkaloid seneciphylline, isolated from ragwort *(Senecio jacobaea, Linn.)*, is shown to be a potent specific hepatotoxic agent in poultry. The preparation and properties of the alkaloid are described, together with toxicity tests and the symptoms and pathology of acute poisoning with this substance. Tests with sub-lethal, weekly intravenous doses in the range 20 mg/kg of the hydrochloride for periods up to 8 weeks resulted in the production of chronic hepatitis and biliary cirrhosis, and the subsequent appearance, in a significant number of cases, of primary liver tumors. Incorporation of the dried milled whole plant less the roots in the food gave essentially similar results. Tests were carried out in groups of both sexes maintained on adequate diet, and on a diet deficient in protein and choline. The usual controls were kept. Males were more susceptible to the toxic effects, but did not ultimately develop more tumors, and the nature of the diet did not affect the final equal distribution of tumors in either group. The demonstration of the carcinogenic properties of seneciphylline is discussed in relationship to the high incidence of cirrhosis and liver cancer in certain Bantu tribes who subsist on deficient diets and who may drink senecio infusions as a component of native medicines. The possible connection between sub-lethal ragwort poisoning in cattle and sheep and so-called cavernous angiomata in the livers of these animals is also discussed in the light of the histo-pathology in cases of experimental poisoning of the fowl.—*J. G. Campbell.* (Biological Abstracts)

CARNAGHAN, R. B. A., and **L. M. MARKSON,** 1956. (Minist. Agric Fish. Food, Vet. Lab., Weybridge.)

STUDIES ON ENCEPHALOMALACIA IN POULTRY. I. THE INCIDENCE IN ENGLAND AND WALES. *Brit. Vet. J., 112:* 140-144. —Records covering the 2 yrs. from 1st Oct. 1953 to 30th Sep. 1955 show that the incidence of the disease, which was encountered only between the 3rd and 8th wk. of life, was higher in ♂ chicks by 7 : 2. Heavy breeds appear to be more susceptible as 95% of cases occurred therein, the majority being of the Light Sussex breed or its crosses; only 3 out of 69 outbreaks involved Leghorn stock, and the affected chicks were all Brown Leghorn×heavy breed crosses. (Animal Breeding Abstracts)

CARTRITE, H. T. (Texas Agric. Expt. Sta., Gonzales.)

CLINICAL OBSERVATIONS ON THE HEMORRHAGIC ANEMIC SYNDROME. *Proc. Amer. Vet. Med. Assoc.* 1955: 359-360. 1955.—Chickens with the acute form die quickly and exhibit a pale comb. In the subacute form, there is little fat; muscle hemorrhages are not as extensive as in the acute form. In the chronic form, the comb is shriveled and the feathers are ruffled.—*J. F. Ryff.* (Biological Abstracts)

COLE, R. K., and **F. B. HUTT.** (Cornell U., Ithaca, N. Y.)

PARENTS' AGE UNRELATED TO LEUCOSIS IN PROGENY. *Poultry Sci. 35(3):* 729-731. 1956.—Progeny from repeated matings (same sire and same dam used as breeders in 2 successive years) were compared with respect to total mortality and to losses from leukosis during the test period of 43 to 500 days of age. During the six-year period of 1949 to 1954 there were 34 repeated matings of leukosis-resistant strains of W. Leghorns. The 260 daughters hatched in the first breeding season did not differ from their 386 full sisters hatched in the second breeding season. Neither was there any difference in the performance of the progeny from 23 repeated matings of a leukosis-susceptible strain of W. Leghorns, involving 180 daughters and their 300 full sisters. It is concluded that the age of the parents in itself does not affect the susceptibility of the progeny to leukosis.—*R. K. Cole.* (Biological Abstracts)

COVER, M. S., W. J. MELLEN, and **E. GILL.** (U. Delaware, Newark.)
STUDIES ON HEMORRHAGIC DISEASE OF CHICKENS. *Proc. Amer. Vet. Med. Assoc.* 1955: 357-359. 1955—Classical symptoms and pathological changes of avitaminosis K are massive or profuse hemorrhage and a resulting anemia. Cases of field hemorrhagic syndrome do not fit this pattern. Prolonged prothrombin time has not been recorded, nor has a massive type of hemorrhage been seen. The typical hemorrhage of the field syndrome involves small, discrete areas. Also extensive field observations lead to the conclusion that the therapeutic use of vitamin K has not resulted in any reasonable measure of success. Furthermore, the hemorrhagic syndrome has appeared in flocks receiving an additional 4 g of vitamin K per ton of feed on a continuous basis. There have been reports of the successful treatment of the hemorrhagic syndrome with various medicaments; however, this is to be expected in a disease having a mortality pattern such as described for this syndrome.—*Auth. summ.* (Biological Abstracts)

FORD, E. J. H. (Boots Pure Drug Co., Ltd., Vet. Sci. Div., Thurgarton, Notts, Eng.)
A SURVEY OF TURKEY MORTALITY. *Brit. Vet. Jour. 112(1):* 3-13. 1956.—Necropsies were performed on birds from 14 farms over a period of a year. Useful figures were obtained from 3 farms only. The main causes of loss were navel infection, gizzard erosion, gizzard impaction, coccidiosis, ulcerative enteritis and a large group of undiagnosed cases.—*K. L. Bullis.* (Biological Abstracts)

GEURDEN, L., A. DEVOS and **M. VAN DEN WYNGAERT.** (Laboratory of Bacteriology and Hygiene, Ghent, Belgium.)
ENKELE ONDERZOEKINGEN IN VERBAND MET PATHOGENE COLIS. *Vlaams Diergeneeskundig Tijdschrift 25; (No. 9-10)* 207-217. 1956.—The authors give a large survey on the pathogenic role and on the antigenic structure of coli's. From pathological processes of foals, calves, pigs, carnivores and poultry they isolated 73 coli-strains. None of these was belonging to the $O_{111}B_4$ group and only low agglutination titers were obtained with serum O_{25}. Coli's of the groups O_{86} and $O_{26}B_6$ were found only in poultry, on the other hand coli's of the group $O_{55}B_5$ were encountered only in carnivores and pigs. Most of the coli strains obtained from carnivores were hemolytic. During this research work a large number of klebisella's was isolated, whose pathogenic role is to be further examined.—*Authors.*

GOODWIN, K., G. E. DICKERSON, W. F. LAMOREUX, KERMIT SCHAAF, and **W. D. URBAN.** (Kimber Farms, Inc., Niles, Calif.)
THE ROLE OF HETEROSIS IN RESISTANCE TO RESPIRATORY LESIONS IN THE FOWL. *Poultry Sci. 35(4):* 915-924. 1956.—Data from two generations show that heterosis is of considerable value in aiding the fowl to resist various unspecified respiratory infections. Females were maintained without culling through 72 weeks of age. Comparisons were made either (a) between a standard non-inbred strain and crosses of other strains, or (b) between 9 pure strains and all possible reciprocal crosses of the same strains. Whether the general level of mortality was low or high (approximately 23% vs. 59% in the 2 years) the crosses showed about one-half as high an incidence of respiratory lesions as the pure strains. The pure strains did not differ in the kinds of respiratory lesions involved, or in the age at which these lesions were most frequently seen.—Auth. summ. (Biological Abstracts)

HILL, E. G., K. P. MISRA, T. H. CANFIELD, E. L. JOHNSON, V. PERMAN, W. R. PRITCHARD, J. H. SAUTTER, and **M. O. SCHULTZE.** (Inst. Agric., U. Minnesota, St. Paul.)
STUDIES ON TRICHLOROETHYLENE-EXTRACTED FEEDS. 8. THE RELATIVE RESISTANCE OF AVIAN SPECIES TO THE TOXIC FACTOR IN TRICHLOROETHYLENE-EXTRACTED SOYBEAN OIL MEAL. *Poultry Sci. 35(3):* 686-692. 1956.—Specimens of trichloroethylene-extracted soybean oil meal which were of known high

toxicity to calves and cattle were fed to chickens from hatching to 19 weeks of age at a level of 35% of the ration. During egg production the same birds received the same type of soybean oil meal at a level of 24% of a laying ration. Growing turkey poults and goslings were fed the same type of soybean oil meal for 8 weeks or 19 days, respectively. With each species the weight increments accomplished by the birds fed trichloroethylene-extracted soybean oil meal were about 90% of those of birds fed analogous rations containing hexane-extracted soybean oil meal. No evidence of the type of blooddyscrasia encountered in calves (aplastic anemia) was obtained with the birds fed trichloroethylene-extracted soybean oil meal. The birds tested are much more resistant than calves or horses to the toxic effects of this type of feed.—*M. O. Schultze.* (Biological Abstracts)

HILL, R. W., and **F. W. LORENZ.** (U. California, Davis.)
STUDIES ON EGG CHANGES FOLLOWING AVIAN RESPIRATORY DISEASES. I. DISEASES ASSOCIATED WITH EGG CHANGES. *Poultry Sci. 35(2):* 409-417. 1956. (Biological Abstracts)

HUTT, F. B., K. GOODWIN, and **W. D. URBAN.** (Kimber Farms, Inc., Niles, Calif.)
INVESTIGATIONS OF NONLAYING HENS. *Cornell Vet. 45(2):* 257-273. 1956.—Nonlaying hens considered in this study had all the signs of laying well, i.e. red combs, loss of beak pigment, full abdomen and spreading of the pubic bones. Of 13,065 Leghorns, 180 or 1.38% were nonlayers. In 284 nonlayers examined, 34.2% were ovulating nonlayers, 28.8% had discontinuous or cystic oviducts, and 20.4% had ovarian retrogression. A nonlayer can develop in hens that at one time laid well. Ovarian retrogression was 8 times more frequent in flocks where artificial lighting of immature pullets was practiced.—*M. S. Hofstad.* (Biological Abstracts)

JOHNSON, A. S. (Canada Dept. Agric., Ottawa.)
INCIDENCE OF AN ABNORMAL HOCK CONDITION IN MALE TURKEYS AS INFLUENCED BY GENETIC DIFFERENCES AND BY HATCH. *Poultry Sci. 35(4):* 790-792. 1956.—A condition of enlarged hocks or perosis, generally accompanied by lameness, and occurring at about 16-20 weeks of age, was seen in a flock of Empire White turkey males. The incidence varied, among 3 hatches, from 5.6 to 28.5%, and, among 20 different sire groups, from 0.0 to 71.4%. There was no significant correlation between the percentage incidence of enlarged hocks and 12-week body weight. However, the low incidence of this defect occurred in the hatch which had the lowest early growth rate.—*A. S. Johnson.* (Biological Abstracts)

JOHNSON, ELTON L., P. E. WAIBEL, and **B. S. POMEROY.** (Sch. Vet. Med., U. Minnesota, St. Paul.)
THE TOXICITY OF ARASAN-TREATED CORN TO HENS AND CHICKS. *Proc. Amer. Vet. Med. Assoc. 1955:* 322-323. 1955.—Tetramethylthiuram disulfide (TMTD) in the form of the fungicide arasan-SFX produced extreme toxicity symptoms in both laying hens and chicks whether included in the diet in the form of treated seed corn or as the purified TMTD as an additive. The chief symptoms among laying hens, in order of occurrence, include the production of misshapen or soft-shelled eggs, retardation of production, and eventually cessation of production. Chicks exhibited adverse effects, due to TMTD in the ration, in the form of reduced growth and feed efficiency and increased incidence of hock disorders which made the birds unable to stand and eventually resulted in increased mortality. In view of the extreme toxity of this compound even at levels as low as 7.5 ppm of TMTD, it is vital that all possible sources be kept out of poultry rations.—From auth. summ. (Biological Abstracts)

KRANEVELD, F. C. and **M. MANSJOER.** 1956. Onderzoekingen over Bloedparasieten. IX Een Trypanosoma bij de Steenduif (Geopelia Striata Striata)
INVESTIGATIONS OF BLOOD-PARASITES. IX. A TRYPANO-

SOME IN THE WILD PIGEON (GEOPELIA STRIATA STRIATA). *Hemera Zoa LXIII (9-10):* 353-363.—After a single microscopic investigation of 500 pigeons (Geopelia striata striata; perkutut) coming from the surrounding of Bogor (West Java), eight cases proved to be carrier of a Trypanosome. During an extensive control and after introducing in the blood-cultivation an increasing of positive cases up to 5% was found. Totally 2100 birds were investigated.

The measures of 200 parasites coming from natural infected birds are shown in the diagram 1-4 and in a table. The organism appeared to be cultivated easily. Infection-proofs on wild pigeons with positive blood as well as with cultures succeeded with complete regularity.

A question whether the concerned parasite is identical or not with the Trypanosome as was found by Kraneveld and Mansjoer (1954) in the turtledove (Streptopelia chinensis tigrina) will be reverted further. (Author's summary)

NEMESERI, L., J. HODOSSY.

TREATMENT OF ASCARIODIOSIS OF FOWLS WITH PETROL. *(Tyukfelek orsofergessegenek kezelese benzinnel.) Magyar Allatorvosok Lapja, Budapest, 1956. 5.* ;;. 120-121.

Petrol given in a dose of 2 ml per kg body weight was used with good results for the treatment of ascaridiosis on more than 600 hens. It can be dosed orally, by means of a rubber pipe set to a syringe, in the empty crop or with an injection needle, through the skin in the half filled crop. According to toxicity examinatons it has, in a therapeutic dose, neither toxic effects, nor undesirable after-effects. It is very cheap and the treatment can be repeated in one or two weeks without any danger. Since individual treatment is required in every case this method is not suitable for mass treatment. (Hungarian Agricultural Review, 3, 1956.)

SANGER, V. L., H. YACOWITZ, and **E. N. MOORE.**

MICROPATHOLOGICAL CHANGES IN AN HEMORRHAGIC SYNDROME IN CHICKENS FED SULFAQUINOXALINE AND SUGGESTED ETIOLOGICAL FACTORS OF THE DISEASE. *Amer. Jour. Vet. Res. 17(65):* 766-770. 1956.—A hemorrhagic syndrome was produced in young chickens by adding 0.05%, 0.1% and 0.15% sulfaquinoxaline to a ration fortified with vitamin K and alfalfa. Control birds on the same ration but without sulfaquinoxaline did not show the condition. Histopathologic studies of tissues from 4 sick birds which received 0.1% sulfaquinoxaline revealed hypoplastic bone marrow with focal necrosis and karyorrhexis. Petechial hemorrhages were present in the skeletal muscles and myocardium along with focal myocarditis in one and hyaline degeneration in another. The spleen contained many areas of focal necrosis. Kidney lesions included necrobiosis of renal epithelium, tubular casts and hemorrhage. Lesions in the brain stem included neuronal degeneration, neuronophagia and focal gliosis. Edema and thrombosis were present in the lung. Petechial hemorrhages were present in the wall of the small intestine and proventriculus. There was evidence of earlier enteritis. A similarity of lesions was seen in the sulfaquinoxaline-treated birds, in naturally occurring field cases of hemorrhagic disease in chickens and in drug allergies in man. Over 50 drugs are known which will produce an acute reaction in man. A wide variety of drugs are currently being used in the treatment of poultry diseases and some of these could conceivably produce similar reactions in chickens. It is suggested that many cases of hemorrhagic disease in chickens are due to drug allergy.—Authors. (Biological Abstracts)

SIEBURTH, J. McN. (Animal Pathol. Sec., Virginia Agric. Exper. Sta., Blacksburg), and **B. S. POMEROY.** (Sch. Vet. Med., U. Minnesota, St. Paul.)

BLUECOMB DISEASE OF TURKEYS. III. PRELIMINARY STUDIES ON ETIOLOGY. *Proc. Amer. Vet. Med. Assoc.* 1955: 301-306. 1955.—Using the supernatant of centrifuged infective intestinal material, 4 drops orally to day old poults produced 100% mortality at 3-7 days. The suspension was active after 1 month at -45°C but only weakly infective after 2 months. Addition of pencillin and streptomycin reduced its infectivity and storage potential. The agent was smaller than in-

testinal bacteria but larger than most filtrable viruses. Supernatant of centrifuged material was propagated in the yolk sac of 7 day embryonating eggs; infected liver tissue allowed propagation of the agent for 13 passages on the chorioallantoic membrane of 12 day eggs—*J. F. Ryff.* (Biological Abstracts)

STURKIE, PAUL D., R. K. RINGER, and H. S. WEISS. (Rutgers U., New Brunswick, N. J.)
RELATIONSHIP OF BLOOD PRESSURE TO MORTALITY IN CHICKENS. *Proc. Soc. Exptl. Biol. and Med. 92(2):* 301-303. 1956.—Systolic blood pressures were determined on adult chickens at 7-10 months of age in 1950, 1952 and 1954. Record of mortality and egg production were kept until the birds were approximately 19 months of age. The birds were divided into 3 pressure groups; high, median and low. Approximately 30% of birds had high pressure, 30% low pressure and 40% intermediate pressure. The mortality of the hypotensive birds was nearly twice that of the other groups. There were no significant differences in the body weights or egg production between birds of the groups. Gross autopsies did not reveal the cause of the higher mortality in the hypotensive birds.—*P. D. Sturkie.* (Biological Abstracts)

WASHKO, F. V. (Vet. Res. Dept. Merck and Co., Inc.), and **C. W. MUSHETT.** (Merck Inst. Therap. Res., Rahway, N. J.)
SOME OBSERVATIONS ON THE PATHOLOGY OF THE HEMORRHAGIC CONDITION OF CHICKENS. *Proc. Amer. Vet. Med. Assoc. 1955:* 360-365. 1955.—Hemorrhagic syndrome designates an apparently new disease most often seen in young birds, possessing a wide range of symptoms, characterized by hemorrhages into the tissues, and of apparently complex etiology. In 5 NE U. S. flocks, the course of the disease was about 3 weeks with mortality up to 30% but the chief loss was from poor food conversion. Diarrhea, pale combs, listlessness, decreased feed consumption, and alarming morbidity were seen. At necropsy, subcutaneous and intramuscular hemorrhages in the breast and leg regions, at the junction of the proventriculus and gizzard, and along the intestinal tract; pink to yellow bone marrow, and sometimes enlarged spleens and necrotic foci in the liver and kidneys were seen. Bone marrows were hypoplastic; liver degeneration and necrosis, acute glomerulonephritis with extensive tubular necrosis, and necrotic enteritis were observed. Anemia, leukopenia, and thrombocytopenia were seen in a moderate number of cases. Prothrombin and whole blood clotting time generally were within normal ranges excluding vit. K as a cause. Cultural examination of tissue failed to disclose an organism as the cause. Sufaquinoxaline fed at high levels to normal chickens failed to produce the disease.—*J. F. Ryff.* (Biological Abstracts)

WILLS, F. K., and **J. P. DELAPLANE.** (Texas Agric. Expt. Sta., College Station.)
TRANSMISSION AND THERAPY STUDIES ON AN AGENT WHICH PRODUCES ARTHRITIS IN CHICKENS. *Proc. Amer. Vet. Med. Assoc. 1955:* 350-357. 1955.—A total of 1470 chicks were hatched from 4 flocks exposed to the agent causing infectious synovitis. One of the offspring was found affected when 21 days old. Possible transmission of the agent through the egg is suggested. Large dosages of chlortetracycline reduced mortality and delayed the occurrence of synovitis following experimental infection of chickens. Under the conditions of the experiment, the treatment appeared to have little practical value.—*Auth. summ.* (Biological Abstracts)

POULTRY PRODUCTS AND MARKETING

ATKINSON, JOE W. (Public Health Serv., U. S. Dept. Health, Education, and Welfare, Washington, D. C.)
POULTRY INSPECTION AND SANITATION. *Proc. Amer. Vet. Med. Assoc. 1955:* 442-450. 1955. (Biological Abstracts)

CHAMBERLIN, V. D., J. WYNE, R. G. JAAP, and **M. G. McCARTNEY.** 1956. (Ohio Agric. Exp. Sta., Wooster.)
STATION PROJECT COMPARES 10 POPULAR STRAINS OF TURKEYS. *Ohio Fm Home Res., 41:* 24-25, 31.—The performance up to 24 wks. of age of 10 strains of White and Bronze turkeys was compared. Each strain was represented by 150 poults. The results are tabulated. Large Bronze strains weighed more at all ages, and had greater breast width, than any other strain. The less efficient strains required about 10% more food per lb. of turkey than the more efficient strains. Mortality was lower in the Bronze (4.5-8.4%) than in the White strains (11.1-15.4%). (Animal Breeding Abstracts)

COTTERILL, O. J. (Iowa State Coll., Ames), and **A. R. WINTER.** (Ohio State U., Columbus.)
EGG WHITE LYSOZYME. 2. THE EFFECT OF THERMOSTABILIZATION. *Poultry Sci. 33(6):* 1185-1191. 1954.—The effect of various thermostabilization conditions on the lytic activity of egg white lysozyme toward *Micrococcus lysodeikticus* was observed. Thermostabilization of eggs during agitation in water at 130°F for 15 minutes increased the egg white quality as measured by Haugh units, increased its turbidity slightly, and did not affect its lysozyme activity. Higher temperatures increased the Haugh unit value and turbidity but decreased the lysozyme activity of egg white. Lysozyme destruction and the increase in turbidity of the egg white were more pronounced in 7-day eggs than in day-old eggs. The beneficial effect of thermostabilization of shell eggs at 130°F for 15 minutes is not a direct result of destruction of lysozyme activity.—*O. J. Cotterill.* (Biological Abstracts)

DAWSON, L. E. (Michigan State U., East Lansing.)
THE EFFECT OF FARM REFRIGERATION ON MARKETABLE QUALITY OF EGGS. *Poultry Sci. 35(3):* 586-592. Illus. 1956.—An evaluation of the practice of cooling eggs in a commercial egg cooler was made. One week's production of eggs each month (February through August) from 3 pens of 150 S. C. White Leghorns was used. One-third of each collection of eggs was placed in each of 3 holding areas; namely, a commercial egg cooler (58°F), feed room of laying house, and basement of service building. Estimated cost of electricity used per dozen eggs (based on cooler used to capacity) was .38 cents. Estimated total cost of cooling eggs was 1.3 cents/dozen. The percentage of AA quality eggs of all eggs candled was 56 held in the cooler, 26 held in basement and 17 held in feed room. Percentages of B quality eggs were .6, 2.1, and 7.8, respectively. A lower percentage of the eggs held in the cooler was checked when candled than those held in the feed room or basement.—*L. E. Dawson.* (Biological Abstracts)

HENDERSON, E. W., L. E. DAWSON, H. C. ZINDEL, and **E. H. FARMER.** 1956. (Dept. Poult. Husb., Michigan State Univ., East Lansing.)
"MICHIGAN MINIATURE" BROILER PRODUCTION. *Quart. Bull. Mich. agric. Exp. Sta., 38:* 547-554.—The investigations described concern the breeding, rearing, and processing and packaging of the small, "game" type broiler, destined to be served individually to gourmets. Such birds should reach about 1½ lb. live weight at an age when they are still tender. As the desirable breast fullness is a characteristic of the Cornish breed and the growth rate of Cornish strains at 12 wks. is known to respond to selection, chicks of several Cornish varieties and crosses were selected in order to test for quick growing birds that would be well-fleshed at 6 or 8 wks. Average weight at 5 and 6 wks. is tabulated for both sexes and all crosses. The majority of the best strains took 6-7 wks. to reach the ideal weight of 1.5 lb. with the minimum acceptable meat type score of 3. About 20% qualified at 5 wks. (Animal Breeding Abstracts)

NYBROTEN, NORMAN, and **THOMAS B. CLARK.** (West Virginia U., Morgantown.)
PRICE CONVERSIONS FOR STYLE OF CUTTING FRYER PARTS. *Poultry Sci. 35(4):* 825-828. 1956.—Yield data were recorded for

thighs, breasts and backs under 2 styles of cutting fryer piece chicken. The fryers were cut home-style and commercial-style under practical conditions. The yields of the parts studied were significantly affected by style of cutting. The non-bone portion of the thigh without oyster—that is, cut homestyle—averaged 81.96% of the thigh with bone, whereas, the non-bone average for thigh with oyster—cut commercial-style—was 84.28%, resulting in a ratio of 1 to .973. Pricing formulas were derived from the relative yields in either style of cutting to average the same price per pound for the whole chicken regardless of which cutting style was used.—*T. B. Clark.* (Biological Abstracts)

ROGERS, CHARLES J., PAUL A. MILLS, and **GEORGE F. STEWART.** (U. California, Davis.)
INCORPORATION AND DISTRIBUTION OF MONOSODIUM GLUTAMATE IN CHICKEN MEAT. *Food Technol. 10(7):* 299-302. 1956.—The distribution obtained by 3 methods (jet injection, dipping, and dusting) of incorporation of monosodium glutamate (MSG) in chicken meat was studied. Experiments revealed that the skin is a considerable barrier to infusion. Samples stored for one week at 35°F after treatment revealed a greater distribution of MSG than those frozen immediately after treatment and thawed 24 hours at 70°F. To obtain "isoactivity" diagrams and radioautograms for visible evidence of MSG diffusion 2-C^{14} labeled glutamic acid was used. Results suggest that satisfactory incorporation may be obtained by improved multiple jet injection, by spraying the cavity of freshly drawn birds with a concentrated MSG solution, or by dusting the cavity with finely powdered MSG.—*C. J. Rogers.* (Biological Abstracts)

TARVER, F. R., Jr., G. C. McGHEE, and **O. E. GOFF.** (U. Tennessee, Knoxville.)
THE RATE OF COOLING AND WATER ABSORPTION OF POULTRY HELD IN VARIOUS MEDIUMS. *Poultry Sci. 35(4):* 905-910. 1956.—Dressed and eviscerated broiler/fryers, hens and cocks were cooled and held in various mediums. During the cooling and holding periods, the carcasses were weighed and/or breast muscle temperatures recorded at designated intervals. Eviscerated poultry showed a faster rate of cooling than dressed poultry. Water and ice mixtures and ice cooling mediums were of apparent equal value in rate of cooling both dressed and eviscerated poultry. The percent weight changes were greater with eviscerated poultry than dressed poultry. Rate of cooling and water absorption of dressed and eviscerated poultry was considered as a relationship between size, finish, surface area exposed, conformation and medium employed.—*F. R. Tarver, Jr.* (Biological Abstracts)

MANAGEMENT

AGCANAS, PABLO B.
OBSERVATIONS ON EGG PRODUCTION AT THE ALABANG STOCK FARM FROM 1947 TO 1950. *Philippine Jour. Animal Indust. 16(1/2):* 49-57. Illus. 1955.—A shifting in the cycle of egg production at Alabang Stock Farm from August, the lowest, and March, the highest, to Sept., the lowest, and Feb., the highest, followed the change of climate and molting season of the birds. The egg production begins to rise from Oct., Nov., Dec., and Jan., reaching its peak in Feb.; then, it gradually decreases to a minimum in Sept. The molting season occurs during the rainy season.—*Auth. summ.* (Biological Abstracts)

BERG, LAWRENCE R., C. M. HAMILTON, and **GORDON E. BEARSE.** (West Washington Exptl. Sta., Puyallup.)
THE EFFECT OF FURAZOLIDONE AND OTHER DRUGS ON THE GROWTH OF CHICKS RAISED ON OLD LITTER CONTAINING COCCIDIA. *Poultry Sci. 35(4):* 876-884. 1956.—Furazolidone, nitrofurazone, sulfaquinoxaline, and nitrophenide were compared as additives

to feed for fryer chicks maintained on old built-up litter containing coccidia. Three experiments were conducted, using the same litter for the 4th, 5th, and 6th times in 11-week tests. Mortality from coccidiosis had been a problem prior to the 3 experiments. It was observed in these tests that furazolidone fed at levels of 55 and 110 ppm promoted increased growth when old built-up litter was used and no real coccidial infection was apparent. Sulfaquinoxaline at a level of 175 ppm was of no value in enhancing growth rate. Likewise, nitrofurazone at a level of 55 ppm failed to give a growth response under these conditions. Nitrophenide at a level of 250 ppm promoted better growth than sulfaquinoxaline and nitrofurazone but not as good as furazolidone. Chicks started on old litter containing coccidia appeared to develop immunity to the disease.—*Auth. summ.* (Biological Abstracts)

FRONDA, F. M., and **AMADO C. CAMPOS.** (U. Philippines College, Laguna.)
IMPROVING POULTRY PRODUCTION IN THE PHILIPPINES. *World's Poultry Sci. Jour. 11(4):* 287-290. 1955.—The Los Banos Cantonese, a strain combining high production and adaptability to local farm conditions had been developed since 1916 and was lost in World War 2. Now farmers are encouraged to use S.C.W. Leghorn males. Rations for laying cages and range flocks were developed containing rice, rice bran, copra, corn, fish meal and shrimp meal. Fresh water shrimp proved superior to fish meal. Soy bean oil meal was superior to mungo meal, germinated mungo meal, cowpea meal, ipl-ipl seed meal, and soybean meal.—*J. B. Christiansen.* (Biological Abstracts)

GRIMBERGEN, A. H. M. Microorganismen, antibiotica en vitamine B 12 in oud strooisel.
MICROOGANISMS, ANTIBIOTICS AND VITAMIN B 12 IN OLD BUILT-UP LITTER. *Tijdschr. Diergeneesk. 80(13):* 605-615. 1955. —Microorganism in old built-up litter can produce antibiotics, which have a growth-promoting activity in chickens. It was shown that in fresh fowl feces the largest portion of the activity is caused not by B 12 per se but by analogous substances (especially factor A). These are also present in old litter but here B 12 is quantitatively the most important component.—*F. de Moulin.* (Biological Abstracts)

HUSTON, TILL M., HENRY L. FULLER, and **CHARLES K. LAURENT.** (U. Georgia Coll. Agric., Athens.)
A COMPARISON OF VARIOUS METHODS OF DEBEAKING BROILERS. *Poultry Sci. 35(4):* 806-810. Illus. 1956.—Approximately 3000 broiler-type chicks were divided into 4 groups, 3 of which were debeaked by various methods. These 4 groups were further subdivided into 2 equal groups each. One sub-group was fed mash and the other fed pellets. There was a highly significant difference in feather score of broilers fed pellets as compared with those fed mash; the mash fed birds being superior. Debeaking resulted in a highly significant improvement in feather scores of broilers fed pellets. In neither group, pellets nor mash, did debeaking result in a significant increase in body weight or improvement in feed efficiency.—*T. M. Huston.* (Biological Abstracts)

MERRITT, E. S., and **R. S. GOWE.** (Canada Dept. Agric., Ottawa.)
STUDIES ON THE REPRODUCTIVE PERFORMANCE OF A TRAP-NESTED FLOCK OF PILGRIM GEESE. *Poultry Sci. 35(4):* 772-783. 1956.—A satisfactory management program for maintaining a breeding flock of geese was described and data on egg production, egg weight, fertility and hatchability of adult geese and growth rate and mortality of growing geese were presented for a trap-nested flock of Pilgrim geese for a period covering 4 years, 1951 to 1954. The average egg production of the flock as a whole was 18, 20, 24 and 29 eggs for the years 1951-1954. The comparable averages for the "pullet" geese were 17, 20, 22 and 26 eggs. It was shown that geese lay more and larger eggs in their 2nd year of production than in their "pullet" year, and there is some evidence that this increase continues at least to their 3rd and 4th year, although at a slower rate. With a mating ratio of 1 male to

5 females, fertility for the complete season for the years 1953 and 1954 was 83% and 91% for geese 2 years old and older and 72% and 63% for "pullet" geese. Hatchability was 87% in 1953 and 86% in 1954 for the older geese and 69% and 63% for "pullet" geese in the same years. Seasonal trends for fertility and hatchability show that fertility declines toward the end of the laying season as the flock declines in egg production, but that hatchability remains constant throughout the laying season.—*E. S. Merritt.* (Biological Abstracts)

SKOGLUND, W. C. (U. New Hampshire, Durham), and **A. W. BROWN.** EFFECT OF FREQUENCY OF GATHERING EGGS UPON HATCHABILITY. *Poultry Sci. 35(2):* 369-371. 1956.—Frequency of gathering eggs from the nest and removal to an egg storage cellar had no consistent effect upon hatchability of the eggs. Data were collected during each of the 4 seasons of the year over a 2 year period. Eggs were gathered 1-4 times daily, incubated at the end of each day, and hatchability records compared with records obtained from eggs gathered hourly during a 9 hour day as controls. Holding the eggs for 7-14 days prior to incubation also failed to demonstrate any significant difference in hatchability which could be related to frequency of gathering. Average daily maximum and minimum temperature records during the experimental periods are presented.—*W. C. Skoglund.* (Biological Abstracts)

SMITH, R. C. (U. Delaware, Newark.) KIND OF LITTER AND BREAST BLISTERS ON BROILERS. *Poultry Sci.35(3):*593-595. 1956.—Sixty-one white-feathered flocks grown on various kinds of litter were observed as they were dressed in processing plants to determine whether kind and condition of litter in broiler houses was responsible for breast blisters on broilers. Heavier broilers tend to have more breast blisters and more bruises. Broilers grown on large corn cobs tend to have more blisters than birds grown on other litters. Broilers grown on ground corn cobs (particles 3/8 inch or less in diameter), sawdust, or shavings all have about the same number of blisters. Wet litter tends to result in more breast blisters on broilers than dry litter. Condition of litter appears to be more important than kind of litter in causing breast blisters on broilers.—*R. C. Smith.* (Biological Abstracts)

SYKES, A. H. 1956. (Agric. Res. Coun. Poult. Res. Centre, Edinburgh.) SHORT DAY-LENGTH AND EGG PRODUCTION IN THE FOWL. *J. Agri. Sci., 47:* 429-434.—Brown Leghorns restricted from the age of 12 wks. to 6 hrs. artificial illumination daily came into lay at the same age as controls (under natural illumination) but at a lower body weight, while av. egg production during the first yr. of lay was only 107 *v.* 208 in the controls. Egg production in experimental birds transferred during Dec.-Aug., to natural illumination increased within 1-2 wks. of the change; transfer from natural to 6-hr. artificial illumination resulted in an immediate decrease in egg production, which was more pronounced in birds transferred later in the year. (April-Aug.). (Animal Breeding Abstracts)

WILSON, WILBOR O., and **HANS ABPLANALP.** (U. California, Davis.) INTERMITTENT LIGHT STIMULI IN EGG PRODUCTION OF CHICKENS. *Poultry Sci. 35(3):* 532-534. 1956.—S. C. White Leghorn pullets and hens were kept in windowless climatic chambers at relatively stable temperatures. These birds were used to compare intermittent versus continuous lighting at levels thought to be suboptimum for egg production. Intermittent light was provided at regular cycles of 4 hours. In a series of tests the quantity of light during the four-hour cycles was set at 90, 60, 45, 15, 5 and 1 minutes. From these experiments the following conclusions may be drawn: Intermittent lighting generally gave higher egg production than the same amount of continuous lighting. Egg production obtained under short photoperiods was not proportionate to the amount of light given. The minimum amount of light needed for an all-or-none response for maintaining egg production in pullets is probably less than 6 evenly spaced one-minute photoperiods

in 24 hours. Hens were more susceptible than pullets to light changes and possiby to other environmental factors. Good layers were more resistant to shocks from light changes than poor layers. The time of oviposition is influenced by light and management factors.—*W. O. Wilson.* (Biological Abstracts)

GENERAL

KERBER, RALEIGH B., and **FRANCES H. BIRD.** (Eastern States Farmers' Exchange, Inc., Feed Res. Center, RFD 3, Rockville, Connecticut.)

A RAPID METHOD FOR PREPARING CHICK CARCASS SAMPLES FOR ANALYSIS. *Poultry Sci. 35(2):* 486-487. 1956.—A rapid and convenient method for preparing samples of a whole chick carcass is described. In this procedure the carcass is homogenized, moisture removed by the lyophilization technique, and the dry residue used for analysis. Many samples of the same chick or groups of chicks may be processed in one working day. The procedure can be applied to other tissues or laboratory animals.—*Auth. summ.* (Biological Abstracts)

SKALLER, F. (C. S. I. R. O. Poultry Res. Center, Werribee, Victoria.)

A POULTRY IMPROVEMENT PLAN FOR AUSTRALIA. *World's Puoltry Sci. Jour. 11(4):* 296-297. 1956. — Accreditation as "Approved Breeding Farm" requires at least 700 adult females per recognized breed kept. "Approved Multiplication Farm" requires use of males from Approved Breeding Farms, only. "Approved Hatcheries" may incubate eggs only from the above two.—*J. B. Christiansen.* (Biological Abstracts)

ADDITIONS TO MEMBERSHIP LIST OF THE WORLD'S POULTRY SCIENCE ASSOCIATION

(Revived since last issue)

AFFILIATIONS

AUSTRALIA

Greer and Ashburner, 414/416 Swanston Street, Melbourne, Victoria
Hutmill Stock and Poultry Food Co., Hartington Street, Glenroy, Victoria
The Director, Developmental Div., Drug Houses of Australia Ltd., P.O. Box 10, Rozelle, Syndey

ENGLAND

Pfizer Limited, Mr. R. A. Paterson, 137/139 Sandgate Road, Folkestone, Kent

MEMBERS

AUSTRALIA

F. E. Binet, c/o GSIRO Poul. Res. Centre, Werribee, Victoria
N. L. Bull, Dungowan, via Tamworth, N.S.W.
L. A. Davies, 5 Altona Street, Abbotsford, N.S.W.
A. Giles, "Bonaventure", Mount Druitt, N.S.W.
J. H. Gulliford, Hawkesbury Agr. College, Richmond, N.S.W.
J. G. Hardy, Carawa Road, Dee Why West, N.S.W.
J. G. Heathfield, 26 Greystone Road, Pendle Hill, N.S.W.
J. Hetherington, 23 Rawson Road, Fairfield West, N.S.W.
T. H. Hodgson, Everlay Stud Poultry Farm, Menangle, N.S.W.
C. Hughes, 11 Ferrar Street, Mount Lawley, Western Australia
C. A. Hurst, New Street, Eltham, Victoria
H. J. Nngham, Box 4, Post Office, Liverpool, N.S.W.
H. Just, Niagara Park, via Cosford, N.S.W.
S. S. Leach, R. M. B. 26, Windsor Road, Baulkham Hills, N.S.W.
S. Lingard, Buderim, Queensland
A. H. Lofts, 20 Pretoria Street, Zillmere, Queensland
H. M. Marsden, Cr. Bayswater & Wattle Roads, Bayswater, Victoria
R. Matthews, c/o "The Weekly Times", 44 Flinders Street, Melbourne, Victoria
G. L. McClymont, University of New England, Armidale, N.S.W.
F. P. Munzberg, Box 166, Tanunda, South Australia
J. M. Musgrove, 16 Wellington Avenue, Blackburn, Victoria

B. Plaude, Hill Road, West Pennant Hills, N.S.W.
L. S. Plumstead, "Redleaf", Greens Road, Dundas, N.S.W.
D. J. Robinson, c/o Annand Robinson & Co., 272 Ruthyen Street, Toowoomba, Queensland
T. J. Robinson, Dept. of Animal Husbandry, University of Sydney, City Road, Glebe, N.S.W.
D. G. Ryan, Junction Road, Nunawading, Victoria
J. P. C. Smith, Department of Agriculture, Parramatta, N.S.W.
S. C. Spencer, Rose Cottage, Dural, N.S.W.
B. Talbot, William Street, Greensborough, Victoria
O. Van Stappen, Pacific Highway, Wyong, N.S.W.
N. A. Young, "Cryovac" P/L P.O. Box 281, Broadway, Syndey, N.S.W.

CANADA

A. E. Ferguson, Ontario Veterinary College, Guelph, Ontario
W. D. Morrison, c/o Toronto Elevators Ltd., P.O. Box 370, Sta. A., Toronto
J. V. Pilon, Poultry Div., Dept. of Agr., Quebec City
J. P. Walker, Dept. Poultry Husbandry, Ontario Agricultural College, Guelph, Ontario

CHILE

C. Junemann M., Casilla 143, Chillan

DENMARK

J. Bugge, Fyns Andels-Fjerkraeslagteri, Svendborg
J. Jacobsen, "Sollerup" Korinth
A. Jensen, Nordjysk Andels-Fjerkraeslagteri, Randers
N. Kjaergaard, Landbrugsraadet, Axelborg, Copenhagen V
H. E. Marthedal, Lab. for Fjerkraeundersogelser, Royal Vet. & Agr. College, Bulowsvej 13, Copenhagen V
C. U. Salk, Danstruplund, Fredenborg
H. Thomsen, "America", Thisted

EGYPT

Ahmed A. H. Bassiouny, Veterinary Department, Ministry of Agriculture, Dokki, Cairo

ENGLAND

Mrs. C. W. Adams, Mere Farm, Enville, Stourbridge, Worcestershire
R. A. Ola Akenyemi, 36, Aberford Road, Wakefield, Yorks
I. Axe, Axholme Poultry Farm, Owston Ferry, Doncaster, Yorkshire
N. Axe, Axholme Poultry Farm, Owston Ferry, Doncaster, Yorkshire
Miss C. M. A. Baker, c/o Mrs. Tennant, 5 Budby Cresc., Welbeck Colliery Vill., Mansfield, Nottinghamshire
W. L. Beattie, c/o Thornber Bros. Ltd., Mythelmroyd, Halifax, Yorks
J. Bennett, Boots Pure Drug Co. Ltd., Vet. Sci., The Priory, Thurgarton, Nottinghamshire
F. G. Beteridge, British Glues & Chemicals Ltd., Imperial House, 15/19 Kingsway, London W.C.2
M. W. Brightmore, Reliance Egg Farm, Burbage, Hinckley, Leics.
D. W. Brooks, Lodge Farm, Horsford, nr. Norwich, Norfolk
J. Brown, Teagues Farm, Scaynes Hill, Haywards Heath, Sussex
C. K. Clarke, Whitehouse Farm, Waldron, Heathfield, Sussex
A. N. Clegg, 12 Kingshill Avenue, St. Albans, Hertforshire
H. H. Covell, The Grange, Bulby, Bourne, Lincs.
J. Daniel, Gifford House, Stebbing Road, Felsted, Dunmow, Essex
G. Eastham, Hutton Manor, Hutton, Preston, Lancs.
S. Fox, Lane End Farm, Shinfield, Reading, Berkshire
J. M. Francis, 10, Lancaster Road, Leicester
D. A. P. Grattan, BOCM Poultry P-M Laboratory, Stoke Mandeville, Bucks.
G. Guttridge, King's Langley, Overwood, Langley Hill, Herts.
E. Hebditch, South Somerset Poultry Farm, Martock, Somerset
H. Ward and Son, 19 Bell Street, Tipton, Staffordshire
J. C. Jeffery, Arundel Farm, Shaftesbury, Dorset
J. W. Jennings, The Poultry Farm, Garsington, Oxford
R. C. Jenings, Lane End Farm, Shinfield, Reading, Berks.
Miss V. M. Lloyd Jones, September Cottage, nr. Upton-on-Severn, Worcestershire
D. M. Johnstone, 6, Southgrove, Burbage, Marborough, Wiltshire

G. H. Kitcher, c/o Lever's Cattle Foods Ltd., Bromborough Port, New Ferry, Birkenhead, Cheshire
D. R. McLachlin, c/o Bird's Eye Foods, Ltd., Hesketh House, Portman Square, London W.1
M. M. Midgley, Air Traffic Control, St. Eval, nr. Wadebridge, Cornwall
T. R. Morris, The University, Reading, Berkshire
W. D. Puddy, White Horse Farm, Codford St. Mary, nr. Warlingham, Wiltshire
F. J. Scott-Whiting, Fennington Weir, Kingston St. Mary, Taunton, Somerset
S. B. Vincent, Kramplingham Hall, Nr. Wymondham, Norfolk
N. E. Wake, Millbrook, Bessels Green, Nr. Sevenoaks, Kent
J. D. Walden, "Heronsmoor", Chipperfield Rd., King's Langley, Hertfordshire
P. Warren, c/o Warren and Wood Ltd., Kingstown Trading Estate, Carlisle, Cumberland
A. Whitton, Aiskew Poultry Farm, Bedale, Yorkshire
H. Wood, c/o Warren and Wood Ltd., Kingstown Trading Estate, Carlisle, Cumberland
P. Woods, 32, Widney Manor Road, Solihull, Warwickshire

ITALY

A. Guendet, Via Piave 11, Arcistate (Varese)

NETHERLANDS

C. L. van Limborgh, c/o N. V. Handel Muj. Trouw en Co., 1, Spinozastraat, Amsterdam (C)
C. Suurenbroeck, c/o N. V. Handel Mij. Trouw en Co., 1, Spinozastraat, Amsterdam (C)

NEW ZEALAND

F. J. Batkin, Browns Road, Tuakau, Auckland
B. H. Chadderton, "Edorvale", Puhinui Road, Papatoetoe, Auckland
A. Davies, Box 2, Kumeu, Auckland
M. Sutton, Department of Agriculture, Dunedin

PAKISTAN

M. H. Ghias, 786, Pir Ellahi Buksh Colony, Karachi 5
K. B. S. A. Haq, Officer on Special Duty, Min. Comm., Govt. Pakinstan, Karachi
Sulaiman H. M. Hussain, 64/5, Aghakhan Street, Lawrence Road, Karachi
N. Islam, 49, Intelligence School, Queens Road, Karachi

PHILIPPINES

G. O. Ranit, Poultry Department, College of Agriculture, College, Laguna

SCOTLAND

H. Morrison, Crosfields, Turriff, Aberdeenshire
J. W. Taylor, 6, Samson Avenue, Kilmarnock, Ayrshire
J. Young, Boglea, Alyth, Perthshire

SPAIN

F. Blanco, Maratines 23, Madrid

SOUTHERN RHODESIA

The Principal, Owebi Agricultural College, P.B. 376B, Salisbury

THAILAND

Svasdi Ruang Sunthorn, Watana Poultry Farm, Kluay Nam Thai Rd., Phra Kanong, Bangkok

TURKEY

H. S. Oytun, Dir., Inst. Parasitology, Veterinary Faculty, Ankara

UNITED STATES

W. E. Clark, Everybody's Poultry Magazine, Exchange Place, Hanover, Pennsylvania
R. G. Foster, P.O. Box 1146, College Station, Texas
M. R. Spivey Fox, Rm9N308, Bldg 10, National Institutes of Health, Bethesda, Maryland
J. W. Megown, 1610 North Lorel Avenue, Chicago, Illinois

VENEZUELA

F. J. Küper Sauné, Nacido en Valencia, Edo. Carabobo

NOTICES TO MEMBERS

Members of Council:

President Coles has appointed the following as Members of Council to represent the countries indicated, the term of office extending until the next regular election.

Australia: Mr. M. Hull and Mr. N. Milne

United States: Mr. Don M. Turnbull

Branch News:

The United Kingdom Branch of the World's Poultry Science Association held its Annual General meeting at the Royal Veterinary College, London, on March 29, 1957, with 63 members present. After the meeting a Conference attended by over 120 persons was held at which 11 papers on various subjects were presented.

The United Kingdom Branch has 408 members distributed as folows: England—328; Scotland—51; Northern Ireland—20; Wales—9.

The Australian Branch has set up a National Committee for the World Poultry Congress to be held in Mexico during 1958. It consists of Prof. Dr. McClymont, Dr. Tribe and Mr. F. Skaller. The committee will encourage Australian participation at the next Congress and the submission of suitable papers from Australian research workers.

Member who wish to submit contributions should contact as soon as possible the Branch President, Mr. F. Skaller, c/CSIRO Poultry Research Centre, Werribee, Vic.

Members in Pakistan:

Membership subscriptions can be paid to Nural Islam, Poultry Officer, Government of Pakistan, 49 Intelligence School, Karachi.

Correction, Edinburgh Congress Report:

In the Proceedings of the Tenth World's Poultry Congress, Edinburgh, 1954, Part II, Paper 3, entitled "The Genetics of a Red Laced Mutant Chicken" by E. W. Henderson, on page 9, the value of Chi Square for the ratio—21:9 should be (.4) instead of 3.1. (Author)

AVIAN DISEASES

The first number of a quarterly journal devoted to publishing articles dealing with the science and control of avian diseases is now in preparation. This issue will be dedicated to the memory of Dr. Fred R. Beaudette and will contain a feature article on his life and work.

The Editorial Board believes that Avian Diseases will fill a real need for those engaged in the field of poultry diseases. It is felt that this journal will also be useful to those not

Parent Stock Hatching Eggs and Baby Chicks For Breeding Purposes From Leading U. S. Breeders

For the best available parent-stock baby chicks and hatching eggs from any breed or breeding farm in the United States, write directly to us for information and prices. We are specialists in this type of business and represent most breeders of the United States.

AGRICULTURAL COMPANY OF PAN AMERICA
GUILFORD, CONN., U.S.A.

directly engaged in working exclusively with poultry disease problems. Veterinarians should find this publication of real value in their practice. Workers in poultry nutrition, physiology, genetics, husbandry, and extension should find this publication extremely useful in keeping abreast of developments in poultry disease research.

Editorial Board

P.P. Levine, Cornell University, Ithaca, N.Y., Editor
H. Van Roekel, University of Massachusetts, Amherst, Mass.
E. Jungherr, University of Connecticut, Storrs, Conn.
R. S. Gentry, Pennsylvania State University, University Park, Pa.
M. Cover, University of Delaware, Newark, Del.
H. Chute, University of Maine, Orono, Me.

Subscription price $5.00 a year in the United States, its territories and possessions and Canada. Address: Avian Diseases, J. H. Whitlock, Business Manager, New York State Veterinary College, Ithaca, New York.

Foreign subscriptions (except Canada) Price $7.00. Address: Bailliere, Tindall and Cox (exclusive agents) 7-8 Henrietta Street, Covent Garden, London W. C. 2, England.

Subscriptions are payable in advance.

research

made
BROAD RANGE
DISEASE PROTECTION
practical with
DR. SALSBURY'S

Polystat®

FOR BROILERS and TURKEYS

Polystat is an entirely different, multi-chemical feed medicant that provides *growth stimulation* as well as *broad-range disease protection* for poultry.

The facts are, as a feed ingredient, Polystat provides protection against COCCIDIOSIS, WORMS, HEXAMITIASIS, BLUE-COMB, SUB-CLINICAL DISEASES; it minimizes STRESSES and STIMULATES FASTER GROWTH ON LESS FEED PER POUND OF BIRD.

Objective, controlled tests, as well as the experience of thousands of successful raisers, prove it . . . make feeds containing Polystat practically a necessity for increased profits in today's broiler and turkey markets.

Polystat does so many things, so well . . . let us give you the detailed factual information. Write today for literature and any special information you may want regarding Polystat.

DR. SALSBURY'S LABORATORIES
Charles City, Iowa

Dr. SALSBURY'S

Nation-wide service to the poultry industry

LATEST POULTRY GRIT STUDIES YOURS *FREE*

Cornell Feed Service
NEW YORK STATE COLLEGE OF AGRICULTURE
ITHACA, NEW YORK
NOVEMBER, 1950
Research Studies Show
Value of Grit for Chickens and Turkeys
M. L. SCOTT and G. F. HEUSER
Department of Poultry Husbandry, Cornell University
Grit Feeding Affects Growth and Feed Utilization of Chicks and Egg Production of Laying Hens
S. L. BALLOUN and R. E. PHILLIPS
Department of Poultry Husbandry, Iowa State College, Ames
TRIALS WITH ADULT BIRDS

The latest poultry grit studies at Cornell and Iowa State Colleges show the importance of Granite Grit in better feed usage for eggs and meat.

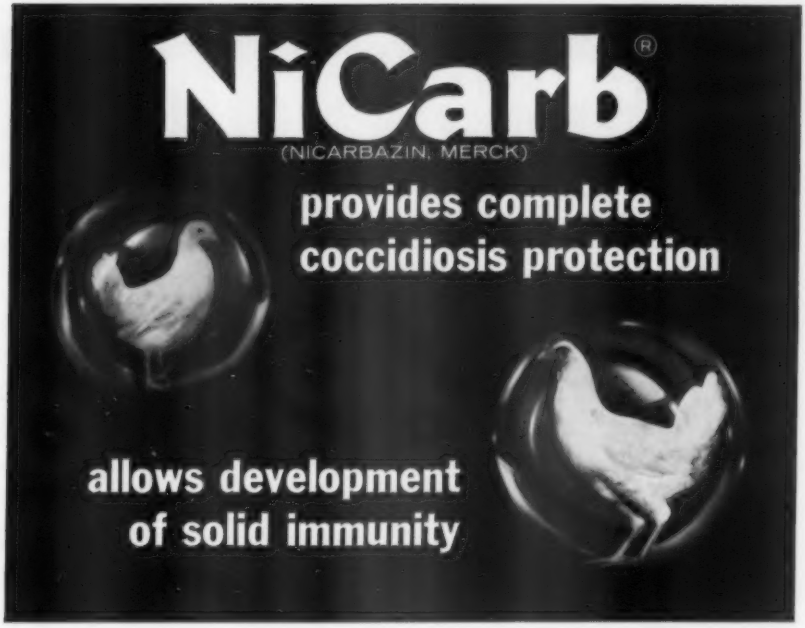
This work by M. L. Scott and G. F. Heuser of Cornell, and S. L. Balloun and R. E. Phillips of Iowa further confirms that insoluble grit is effective in reducing poultry production costs.

There is also increasing evidence that larger size granite grit fed earlier gives increased feed efficiency, develops larger and stronger gizzard muscles, with less grit consumed.

Write for excerpts from these studies. They are free if you address

GRANITE GRIT INSTITUTE OF AMERICA, INC.

630 Fifth Avenue, New York 20, N. Y.



In recent years, much discussion has arisen over the question of whether any preventive coccidiostat fully meets the anti-coccidial needs of the replacement flock owner. To do so, the drug should (a) permit development of immunity in suitably protected replacements, and (b) be sufficiently flexible to meet the need for protection in the face of varying levels of coccidiosis exposure.

A long series of Merck trials in the laboratory and in the field now confirm that one drug—NICARB—meets these requirements. These trials can be summarized as follows:

1. NICARB permits exposed replacements to establish immunity to coccidiosis. This immunity is equal in every respect to that occurring in unprotected birds which have survived an attack of coccidiosis.
2. This immunity has developed in every case on exposure to cecal coccidiosis (*E.tenella*) and intestinal coccidiosis (*E.necatrix*, *E.acervulina* and *E.maxima*).
3. NICARB markedly suppresses oocyst production but does not eliminate oocysts completely. As a result, other birds and subsequent broods may be exposed to the coccidia in the litter and thus are permitted to develop their own immunity.
4. NICARB is highly flexible, allowing effective immunity to develop over a wide range of exposure.

Because NICARB is intended only for preventive use, and because precise formulation is mandatory, it is marketed exclusively in the feeds of reputable feed manufacturers. Your knowledge of this product, however, will permit you to be of distinct professional service to your poultry clients.

For complete details on the immunity trials discussed above, send today for the Merck Service Bulletin, using the coupon below.

MERCK

MERCK & CO., INC.
Chemical Division, Lincoln Avenue,
Rahway, New Jersey

Please send your new Service Bulletin on immunity trials with NICARB.

NAME_____

ADDRESS_____

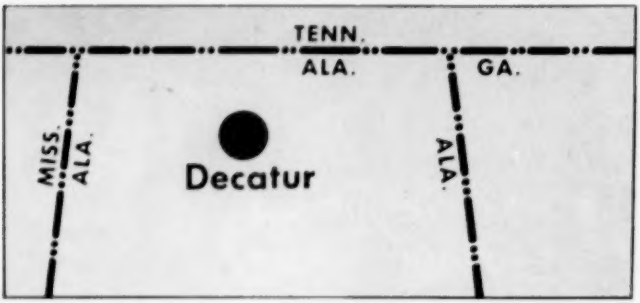
FIRM_____

© Merck & Co., Inc.

Ful-O-Pep studies all phases of the

BROILER BUSINESS

in Northern Alabama



Here's where extensive research is being done . . . right in the heart of one of the biggest broiler producing areas in the country!

BREEDING AND HATCHING. Breeder supply flocks, consisting of 25,000 hens, supply the up-to-date Ful-O-Pep Hatchery at Athens, Alabama, with high quality eggs. In fact, eggs from these hens last year averaged 82 chicks sold per 100 eggs set. Weekly capacity of the hatchery is 58,000 chicks.

PROCESSING AND MARKETING. 25,000 birds are processed daily at the modern Ful-O-Pep plant at Decatur, Alabama. Birds that have been tested on different rations are carefully checked for carcass quality and color. The dressed birds are marketed through two wholesale outlets located at Nashville and Memphis, Tenn.

GROWING AND FEEDING. 40,000 birds are continuously under close surveillance at Ful-O-Pep research houses where practical housing and management methods are being used. New ingredients . . . new formulas . . . and new coccidiostats and other medications are tested to determine the most efficient and economical way to grow broilers. In addition, 400,000 broilers are continuously on feed.

PARTNERS IN PROGRESS. This continuous research in Alabama, is to help the breeder, grower and operator, make more money. Not only has it enabled Ful-O-Pep to produce better breeder and broiler feeds, but also has helped solve some hatchery, processing and marketing problems. Yes, nutritional leadership and proved performance is the story of Ful-O-Pep . . . a story of profit to poultrymen.

THE QUAKER OATS COMPANY

. . . makers of dependable feeds for over 70 years

ADVERTISEMENT — This is a paid advertisement Prepared by U. S. Industrial Chemicals Co.

U.S.I. FEED NEWS

★ A SERIES FOR SCIENTISTS AND EXECUTIVES OF THE FEED MANUFACTURING INDUSTRY ★

Effectiveness of Energy-Protein Ratio Depends on Proper Amino Acid Balance

It is felt by some authorities that the important biological factor of protein quality is oftentimes overshadowed or overlooked due to the significance attached to the mathematical value of a protein-energy ratio. For highest feed efficiency at lowest feed cost, protein quality must be looked upon as being just as important as the amount of protein in the diet.

Proper amino acid balance — the most accurate indication of protein quality — is essential, otherwise the animal cannot make efficient use of the energy and other nutrients in the ration. In fact, a deficiency of an essential amino acid can cause failure of the entire diet.

Methionine is one of the essential sulfur amino acids necessary for proper amino acid balance and is the one most likely to be deficient in poultry starting rations. Experiments and field results have proved beyond doubt that supplemental methionine will increase feed efficiency and improve feathering and market finish of birds.

Price reductions during the past year make it more practical than ever to include methionine in formulations. In addition, U.S.I. has a wall chart, handy formula, and work sheets that make it simple and easy to estimate methionine requirements of a poultry ration in relation to the energy level. Copies free on request. Write Editor.

DL-METHIONINE FOR HIGH ENERGY RATIONS

U.S.I. is the pioneer producer of methionine, the low-cost, essential amino acid. Rations that are supplemented with DL-Methionine produce increased return over feed costs and a more rapid growth rate. Methionine is also effective in improving feathering. Your best supply — from U.S.I.

U.S.I. Feed News A Regular Feature

Each month U.S.I. publishes a full page FEED NEWS in the leading publications reaching nutritional and feed formulation specialists. Informative items of interest to all who use feeds and feed supplements are included. Follow this series in U.S. feed publications for new developments in the poultry feeding industry, or send us your name, address and title on your company letterhead to be placed on our mailing list.

FORMULATION SERVICE OFFERED BY U.S.I.

Of particular interest to foreign feed manufacturers is U.S.I.'s formulation service. Special mixes of vitamins, antibiotics and methionine designed to meet your specifications are available. In addition, U.S.I. will be glad to review your formulas in the light of new concepts in nutrition.

FEED PRODUCTS OF U.S.I.

- VACATONE 40* (molasses distillers dried solubles)
- U.S.I. VITAMIN B_{12} AND ANTIBIOTIC FEED SUPPLEMENTS
- U.S.I. CHOLINE CHLORIDE (25% dry or 70% solution)
- U.S.I. MENADIONE MIXES (vitamin K_3)
- U.S.I. RIBOFLAVIN Products
- U.S.I. NIACIN
- U.S.I. Permadry "sealed in" Vitamin A Products
- U.S.I. CALCIUM PANTOTHENATE Products
- U.S.I. DL-METHIONINE (feed grade)
- U.S.I. VITAMIN D_3 Products (stabilized)
- USIMIX* Custom Vitamin Premixes

*Reg. U.S. Pat. Off.

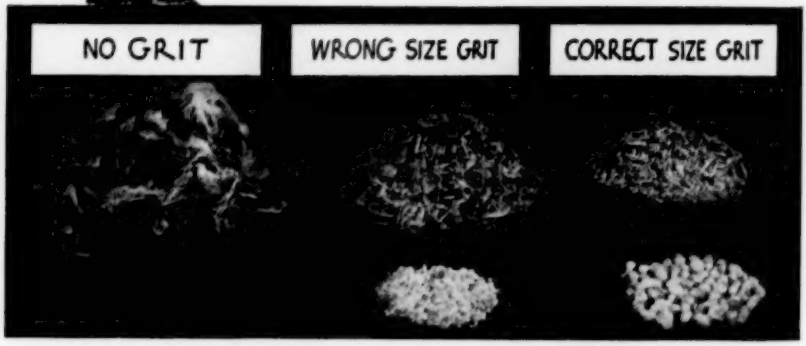
BRANCHES IN ALL PRINCIPAL CITIES

U.S. INDUSTRIAL CHEMICALS CO.

Division of National Distillers and Chemical Corporation

99 Park Avenue, New York 16, N. Y.

Do litter, feathers and fiber rob your birds of gizzard space for processing feed for eggs?



This picture tells you why Stonemo Granite Grit is needed

Look at this picture carefully. At the end of 22 weeks these pullets fed an all-mash diet were killed and the gizzard's contents washed and later dried.

Note the fiber, feather, litter content of the gizzard from a single bird (see section of picture marked "no grit".) Note how much less cloggy bulk there is even when fine size grit (the wrong size) is used (see section of picture marked "wrong size grit".)

Now look at the section of the picture marked "correct size grit." See how fine the granite grit grinds the feathers, litter, and fiber. This gives birds more room in their gizzards for processing feed for extra eggs.

That's another reason why layers receiving Stonemo Granite Grit show better feed conversion and you have less cost in producing a dozen eggs.

These scientific studies conducted on Stonemo's Research Farm point the way to bigger poultry profits. Give your birds Stonemo for good healthy gizzards. Stonemo grinds up feathers, fiber and litter—saves feed and reduces egg producing costs. We recommend birds receive fine size Stonemo for the first three weeks, medium size through six weeks, then coarse size Stonemo.

No product in poultry management costs so little and does so much to make money for you as Stonemo Granite Grit.

STONE MOUNTAIN GRIT COMPANY, INC.
Lithonia, Georgia

STONEMO

the grit with the

EXTRA GRINDING SURFACES

Aurofac®

AUREOMYCIN® Chlortetracycline and Vitamin B_{12} Mixture

LEADER IN THE FIELD OF POULTRY NUTRITION

AUROFAC the first and most widely used antibiotic feed supplement, has now been shown to exert even greater activity when fed continuously at levels of 50 to 200 grams per ton of feed.

The incidence of such debilitating diseases as CRD, blue comb, sinusitis and nonspecific enteritis is markedly reduced in flocks which receive continuous high levels of AUREOMYCIN Chlortetracycline in the ration. It has also been observed that high levels of AUREOMYCIN increase the rate of growth and feed efficiency, and reduce the number of death losses and culls when fed uninterruptedly from hatching until marketing. In layer flocks, egg production, hatchability and livability of chicks are often considerably improved.

Extensive field trials, involving over 2,000,000 birds, have proved that continuous high level feeding of AUREOMYCIN is highly effective and economically practical under actual poultry-raising conditions.

For further information on AUROFAC Feed Supplement and AUREOMYCIN, write to AMERICAN CYANAMID COMPANY, FARM AND HOME DIVISION, NEW YORK 20, N. Y.

CYANAMID

. EFFICACY
. PALATABILITY
. ECONOMY

. . . basic factors in the formulation of Whitmoyer "Products of Scientific Merit"

A quarter of a century ago Whitmoyer Laboratories was founded to meet the then existing need for a more scientific approach to problems of poultry health and nutrition. Now—in this our 25th Anniversary Year—our continued aim is to provide the poultry and feed industry with products of proven efficacy, palatability and economy.

Important recent developments include products in the antibiotic field and in the field of coccidiosis control.

KEMITRACIN is a chemically pure antibiotic complex which provides the feed industry with an antibiotic of the highest uniformity and purity. It is used in the feed at the same gram level as any other quality antibiotic for disease control, improving egg production or for growth promotion.

AQUATRACIN is a similar antibiotic designed for use in the drinking water of poultry and swine. It dissolves rapidly and uniformly. AQUATRACIN is so completely soluble that it can be used in mechanical waterers without any difficulty. There is no sediment to clog the waterers.

WHITSYN products utilize synergism to gain maximum effectiveness in coccidiosis control with a minimum drug dosage. There is a product for each phase of coccidiosis control. WHITSYN-S is used in the drinking water for treating outbreaks. WHITSYN-5 is used in the feed for treating outbreaks. WHITSYN-10 is used in the feed for preventing coccidiosis. Each product is effective against both the cecal and intestinal types.

Your request for additional data on these—or on other Whitmoyer products—will be most welcome. You are cordially invited, too, to consult with our staff members on poultry health or nutritional matters.

Whitmoyer LABORATORIES INC

Manufacturing Chemists

MYERSTOWN, PENNA., U. S. A.

IN CANADA: Whitmoyer Laboratories, Ltd., Yarmouth, Nova Scotia

No Profitable Business

In Poultry and Livestock Products Without

King

THE MOST IMPORTANT FRENCH LABORATORIES

60 rue Monte Cristo - Marseille - France

SERVING ANIMAL INDUSTRY IN EUROPE

ANTIBIOTICS
ANTIOXYDANTS
BIOLOGICS
COCCIDIOSTATS
DISINFECTANTS
GRIT
MINERALS
OESTROGENS
PESTICIDES
SYNTHETIC MILKS
VACCINES
VITAMINS

AND ANY PHARMACEUTICS FOR POULTRY AND LIVESTOCK

BRANCHES IN SPAIN • ITALY • NORTH AFRICA

INTERNATIONAL D.N.A. SCIENTIFIC ASSOCIATION

ELEVENTH
WORLD'S POULTRY
CONGRESS

MEXICO CITY
MEXICO
1958